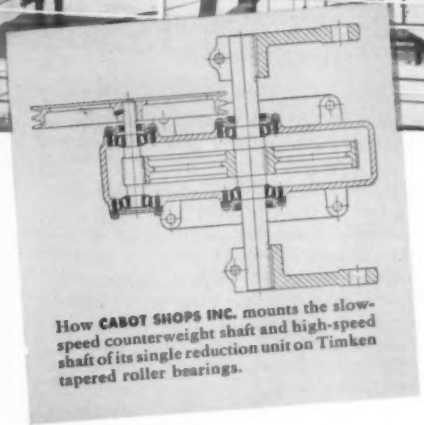
the OIL AND GAS JOURNAL

No production slump with pumping unit on TIMKEN® bearings



How **CABOT SHOPS INC.** mounts the slow-speed counterweight shaft and high-speed shaft of its single reduction unit on Timken tapered roller bearings.

THIS Cabot Shops Inc. pumping unit uses Timken® tapered roller bearings on the slow-speed counterweight shaft and high-speed shaft of its reduction unit. Timken bearings keep reduction gears in alignment, insure accurate meshing. Wear is reduced, maintenance minimized. The pumping unit stays on the job!

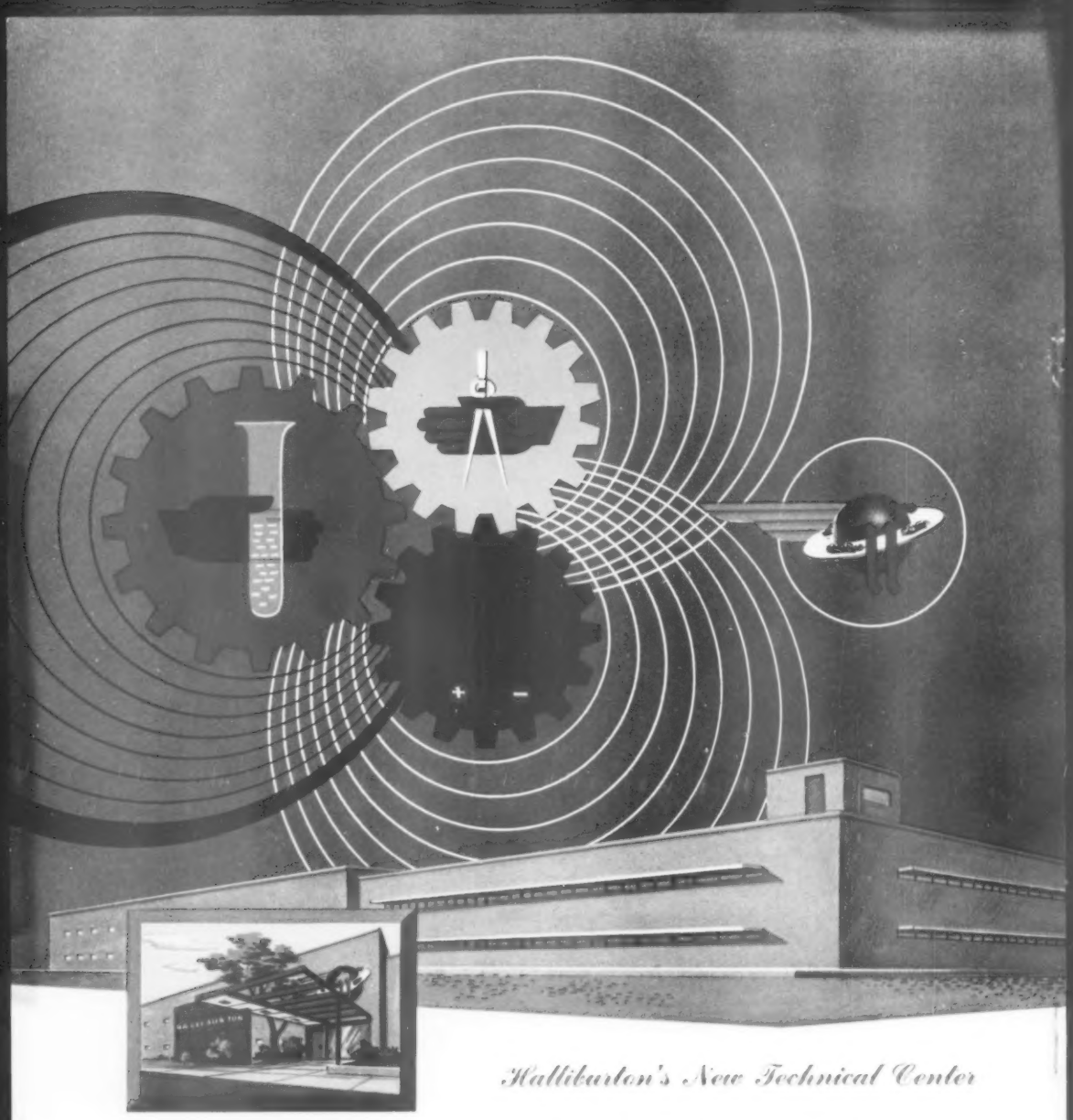
Because of their tapered construction, Timken bearings take both radial and thrust loads in *any* combination. End-play and deflection are minimized, reducing wear on the gears.

Line contact between the rollers and races of Timken bearings gives them extra load-carrying capacity. They make closures more effective by holding shaft and housings concentric. Lubricant stays in—dirt and moisture stay out. Lubrication costs are held to a minimum.

No other bearing can give you all the advantages you get from Timken bearings. Specify Timken bearings for the oil field equipment you build or buy. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ↓ AND THRUST →◯← LOADS OR ANY COMBINATION



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INTEGRATED FOR GREATER RESEARCH

Tomorrow's in the making on a major scale at Halliburton. For there on the horizon a new Technical Center rises. This big, modern building will dovetail all the sciences dedicated to developing new tools and technology. Now more closely integrated for even greater research are the highest skills of Engineering, Chemistry, and Electronics. Pure scientific projects contribute academic knowledge for practical application to immediate and future problems. Every new discovery opens new vistas for experimentation and whets the urge to find still better ways of doing things. The new Technical Center culminates a quarter century of energetic research. But Halliburton is nowhere near satisfied with its progress – you can expect Halliburton to continue enriching the industry with important production improvement techniques.

HALLIBURTON OIL WELL CEMENTING CO., DUNCAN, OKLAHOMA

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES

the OIL AND GAS JOURNAL

MARCH 2, 1953 VOL. 51 NO. 43

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1. REFINING FLEXIBILITY . . . The five refineries of Standard Oil Co. of Ohio are interconnected by pipe line, waterways, and railroads. Feed stocks, intermediates, and finished products may be moved from refinery to refinery as required. Virgin gas-oil feed to cat crackers is moved by pipe line. Alkylation feed stock is pipe lined to the company's one alkylation unit. By Gerald L. Farrar.

•

2. SYNTHETIC LUBRICANTS are not intended to replace petroleum oils. The production of significant quantities of these materials has resulted from the stringent requirements for lubricants in a number of applications. Among these are (1) winter-grade crankcase oils, (2) turbo-engine oils, (3) lubricants for aviation instruments, and (4) lubrication of automatic weapons. A Journal report by four authorities on this subject.

•

3. A STRONG WATER DRIVE acting on a reef limestone reservoir has resulted in 3 years of excellent production operation. The reservoir contains an undersaturated sweet crude 8,100 ft. deep, with as much as 486 ft. of closure above water. As of October 1, 1952, total cumulative production amounted to 5.1 million barrels. Bottom-hole pressure has dropped 425 psi. to about 3,250 psi. By H. Judson Brady, Seaboard Oil Co.

•

4. HYDRAULIC FORMATION FRACTURING at Big Foot field has resulted in active drilling campaign in this once marginal producing field in northeastern Frio County, Texas. The treated formation is the Olmos sands. Prior to fracturing, individual wells produced 5 to 35 bbl. per day of oil, total field production being some 40,000 bbl. monthly. Present production is about 105,000 bbl. monthly. By John C. McCaslin.

•

5. PERMIAN BASIN DRILLING . . . Lea County in Southeast New Mexico continues to improve its leading position in Permian basin exploratory and development drilling. During the week ended January 26, 132 rotary rigs were active in the county. This activity is currently comprised of 19 exploratory wells and 113 development wells. By Joseph A. Kornfeld.

•

6. A NEW GEOLOGICAL TECHNIQUE for studying the thickness relationship of a stratigraphic section and comparing it with other entire sections in the same illustration. This technique adds vertical perspective to augment the limited horizontal perspective of the single-unit isopach map. By A. H. Wadsworth, Jr., independent geologist.

•

7. OFFSHORE OIL . . . A discussion of the continental shelves throughout the world with descriptions of specific ways and means for developing additional production on shelf areas when economic conditions warrant. In some climates drilling and producing operations may be simpler than for some inland sites. By J. C. Miller, United States Geological Survey.

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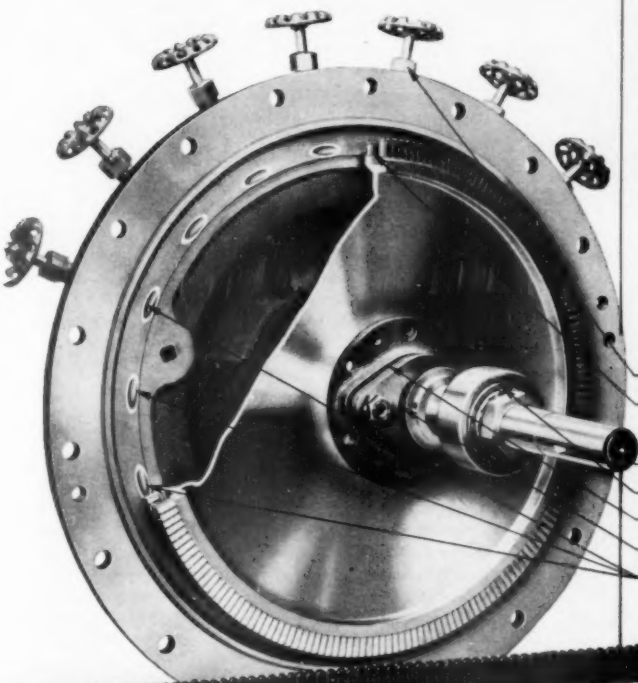

- 7 hand valves for efficient partial load operation, (20" turbine shown)
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- Stuffing box with metallic packing ring
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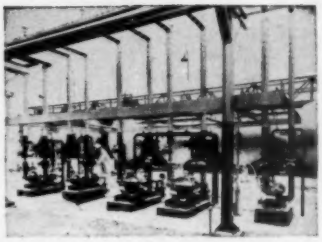

Coppus Steam Turbines, Type TF, driving chemical transfer pumps at Celanese Corporation of America's Chemcel Plant

Coppus Steam Turbines ranging from 150 hp down to fractional in 6 frame sizes

MAKE TURBINE DOLLARS GO FARTHER

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WRITE FOR BULLETIN 135

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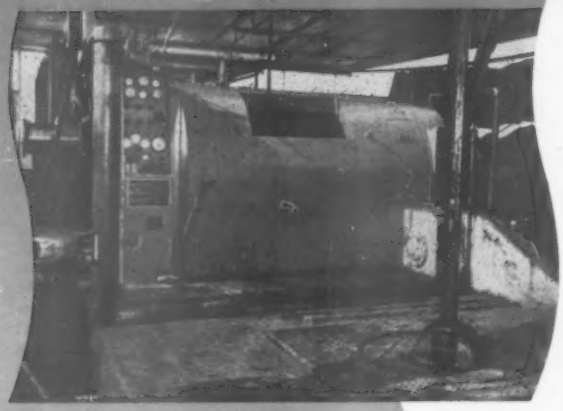
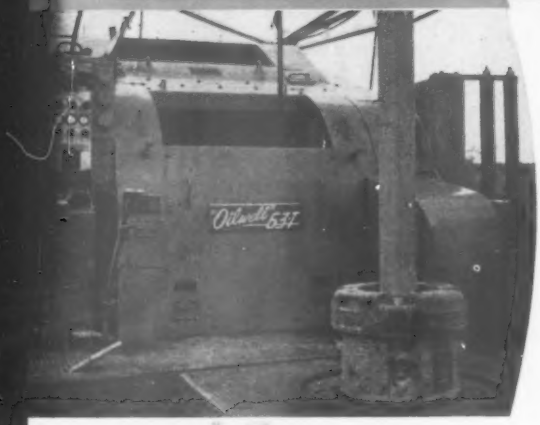
are setting OUTSTANDING Performance Standards



The No. 96

—for DEEP-Well Drilling

This fully-unitized rig with its responsive air controls is designed to drill 15,000 feet with $4\frac{1}{2}$" drill pipe—and deeper with $3\frac{1}{2}$". Three or four engine drives provide two pump take-offs. Companion "Oilwell" equipment—No. 580 Crown Blocks, No. 480 Traveling Blocks, No. S6-400 Swivels, No. 26-HD Rotaries and No. 220-P Pumps.



The No. 76

—for MEDIUM-DEEP Drilling

This compact rig with its unitized assemblies and simplified air controls provides economical drilling to 10,000 feet with $4\frac{1}{2}$" drill pipe; exceeding the range of most competitive models of comparable size and weight. Compound drive can be furnished with two or three engines and take-offs for either one or two pumps. Companion "Oilwell" equipment—No. 360 Crown Blocks, No. 300 Traveling Blocks, No. S5-200 Swivels, $20\frac{1}{2}$" Rotaries and No. 214-P or No. 218-P Pumps.

The No. 66

—for MEDIUM Drilling Depths

This extremely compact rig is rated for drilling to 7,500 feet with $4\frac{1}{2}$" drill pipe and can be transported intact with two or three engine drive. It is equipped with air controls and built-in Hydromatic Brake and can be furnished with standard mechanical drive or with torque-convertor drive. Companion "Oilwell" equipment—No. 250 Crown Blocks, 66-in. Traveling Blocks, No. S4-100 Swivels, No. $17\frac{1}{2}$-C or D Rotaries and No. 212-P or No. 214-P Pumps.

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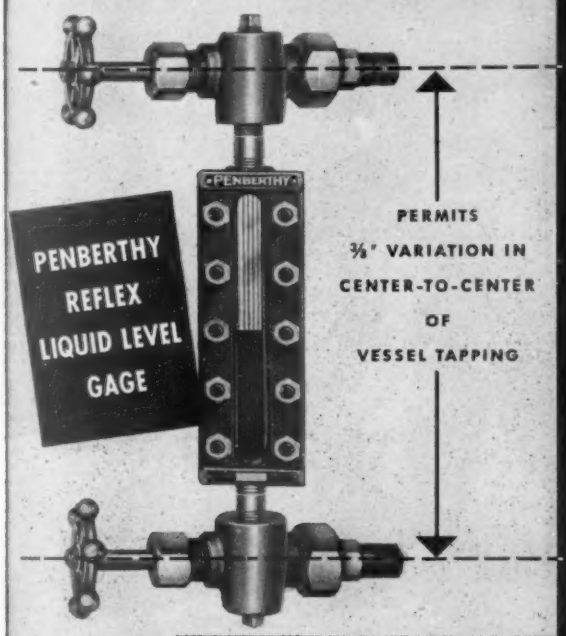

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Saves Time and Money in Gage Installation

A feature available only on Penberthy drop forged steel (and alloy) gage valves, the "floating shank" automatically compensates for as much as ⅜" variation in the center-to-center distance of the vessel tapping. This saves time and cuts the cost of gage installation . . . eliminates stresses often induced during mounting. Penberthy "floating shank" is available at slight additional cost. It will pay you well to specify "floating shank" on your next gage order.

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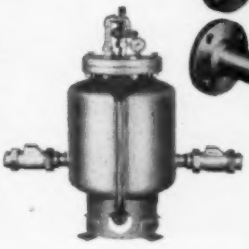
PENBERTHY TRANSPARENT GAGE

Used to observe color and density of liquids under high pressures and/or temperatures. Exceptionally sturdy construction—liquid chamber machined from solid block of metal. Ask for Catalog 35.



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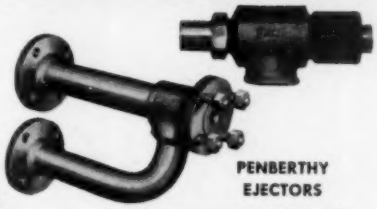

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DIVISION OF THE BUFFALO-ECLIPSE CORPORATION

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Cooling?

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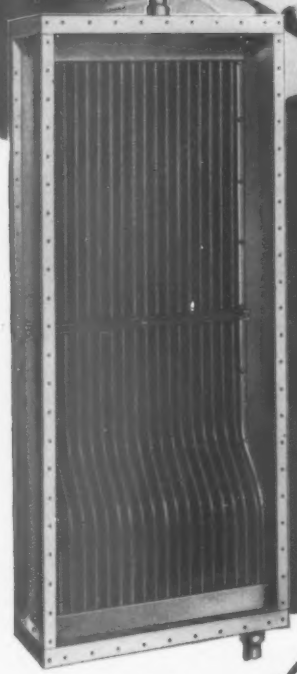
Process?



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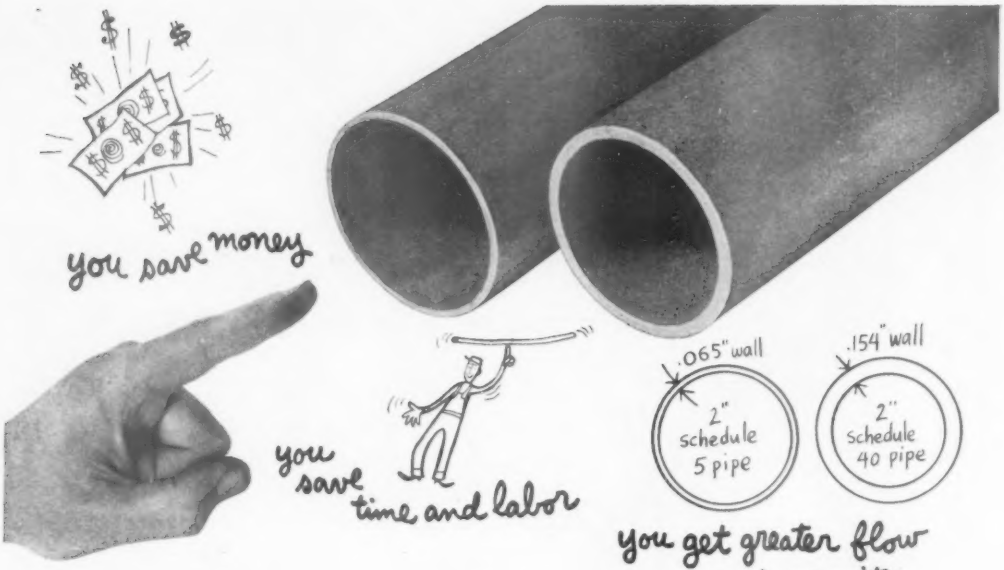

when you specify light wall schedule 5 pipe

WHAT SCHEDULE 5 PIPE IS—
A light wall pipe, Carpenter Schedule 5 gives you more feet of pipe for every pound of scarce stainless steel. So you can quickly see how Schedule 5 reduces your cost per foot. Plus the fact that the larger I.D. means increased flow area.

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First saving is 40% to 50% on the cost of your pipe.

Since Schedule 5 is considerably lighter, this means quicker and easier installation.

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This pipe is easily adapted to use with existing lines of tubing or Schedule 40 and 10 pipe, using simple connectors. Fittings as well as stocks of Schedule 5 pipe are carried by conveniently located Carpenter distributors.

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Tubing sizes can now be replaced with light wall *pipe* . . . for ready hook-up with standard valves, pumps and other equipment which is normally manufactured in pipe sizes.

Data Sheets give you complete information about Carpenter Schedule 5 Stainless Pipe. Write for your personal copy. THE CARPENTER STEEL COMPANY, Alloy Tube Division, Union, N. J.
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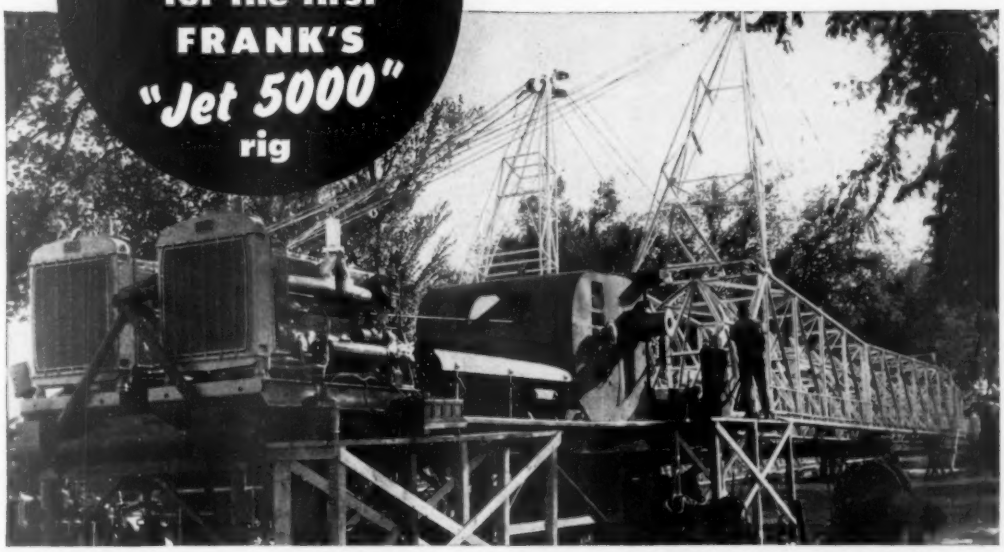
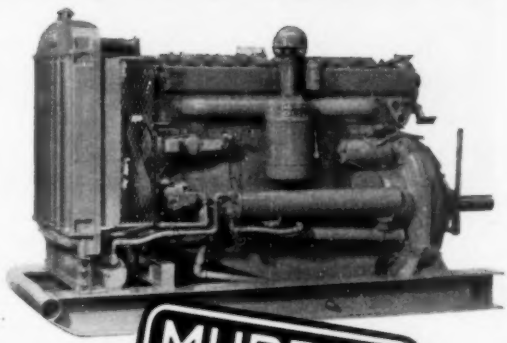
MURPHY DIESEL POWER

for the first FRANK'S "Jet 5000" rig



WHEN the first new Frank's "Jet 5000" rig went out it had two Murphy Diesel Model 221G dual fuel engines for power. Each of these engines is rated at 162 H.P. continuous, 174 H.P. intermittent. Since the photo above was made, the rig has been delivered to Krug Exploration and Drilling Company, Bakersfield, California. The compounded engines also power the 7¼" x 14" Gardner-Denver mud pump.

On a new rig or one already in service, Murphy Diesel gives you the kind of power that makes more hole for less cost. It will pay you, too, to find out more about Murphy Diesel power. Ask your Murphy Diesel Dealer to give you the full story and be sure to ask him for a copy of the booklet, "10 Questions to Ask a Diesel Engine Salesman."



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for the oilfields

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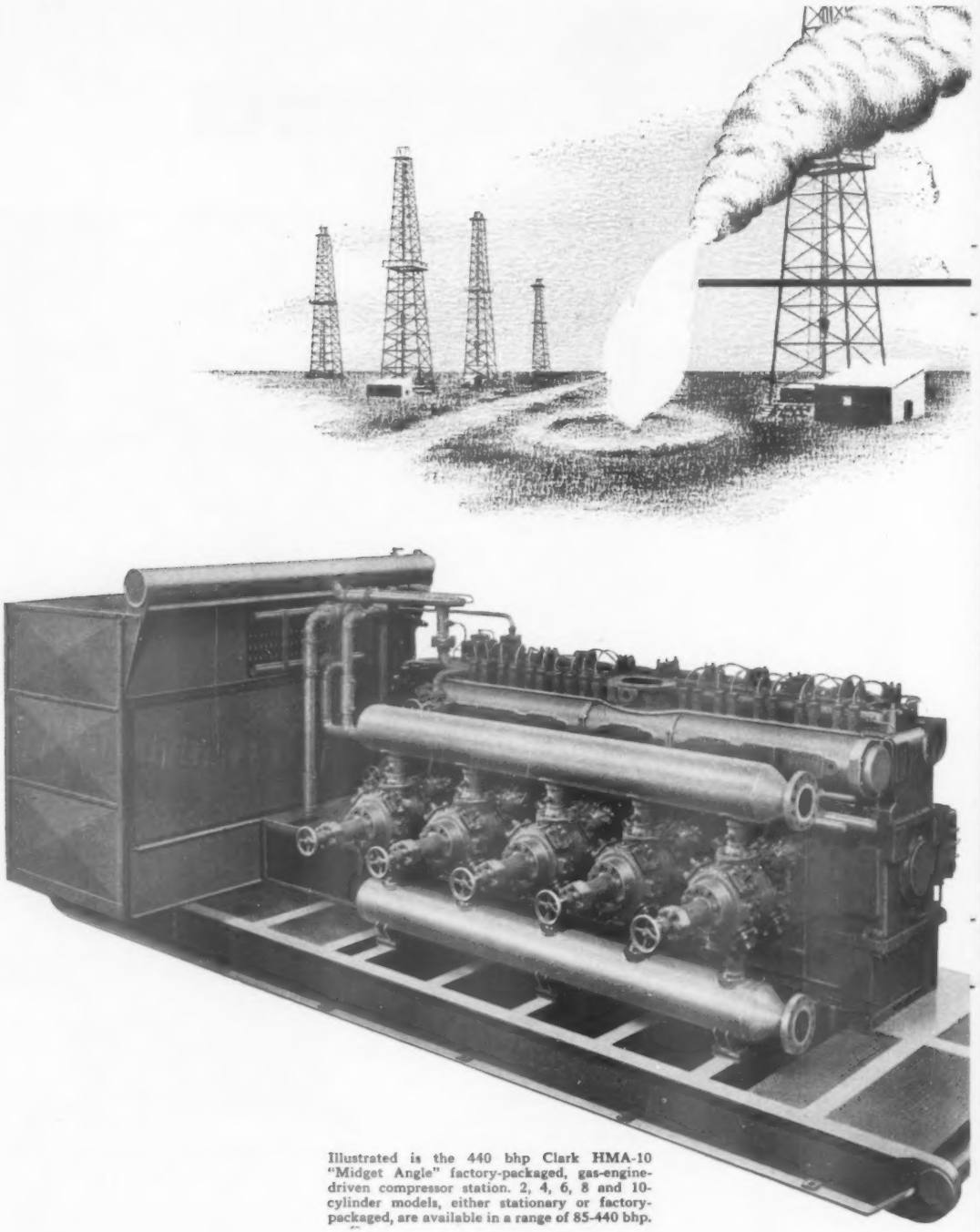

Illustrated is the 440 bhp Clark HMA-10 "Midget Angle" factory-packaged, gas-engine-driven compressor station. 2, 4, 6, 8 and 10-cylinder models, either stationary or factory-packaged, are available in a range of 85-440 bhp.

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FLARE GAS...

waste or profit?

whether you inject it, sell it or process it
Clark "Midget Angles" quickly turn it into profits

Are you burning flare gas, or are you limiting your production because of inadequate compressor facilities to take care of it?

Either way, you are losing dollars which could *quickly* be turned into profits with a Clark "Midget Angle." It will pay for itself in *less* than a year!

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Perfect balance, a tough, rugged design, precision construction throughout — these are the Clark features that assure dependability and long life. You don't have to "baby" or pamper a Clark Midget Angle!

Performance-proved by over 600 field installations throughout the world, the Clark Midget Angle is the most practical compressor within its horsepower range for: field gas gathering, gas lifting, repressuring, flare gas elimination, recycling plant feeders, pipeline testing and many other uses. Your Clark representative will give you the facts and figures. Write for Bulletin 126.

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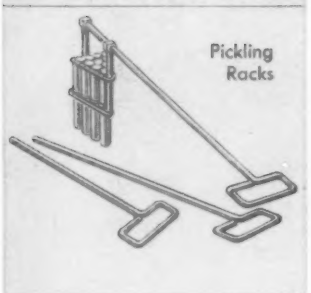
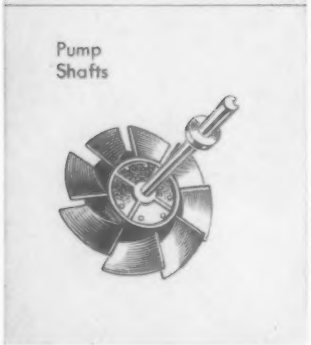


Pickling Racks

Pump Shafts



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Trade-Mark

FOR SEVERE SERVICE CONDITIONS

Four different HAYNES alloys are available in hot-rolled and forged bar stock for the fabrication of parts subjected to heat, corrosion, or oxidation. Each alloy has an unusual combination of properties to combat certain severe service conditions, as indicated by the chart below. Typical parts made from HAYNES alloy bar stock are piston rods, valve stems, pickling racks, pump shafts, bolts, needle valves and forgings such as automotive valves and turbine blades.

Round bars are available in diameters from $3\frac{1}{2}$ in. down to $\frac{1}{4}$ inch. Rounds larger than $3\frac{1}{2}$ in. in diameter can be obtained as hot forgings.

HAYNES alloy bars can be turned, ground, drilled, tapped, reamed, threaded, and welded.

For further information about HAYNES alloy bar stock, contact the nearest Haynes Stellite Company district office.

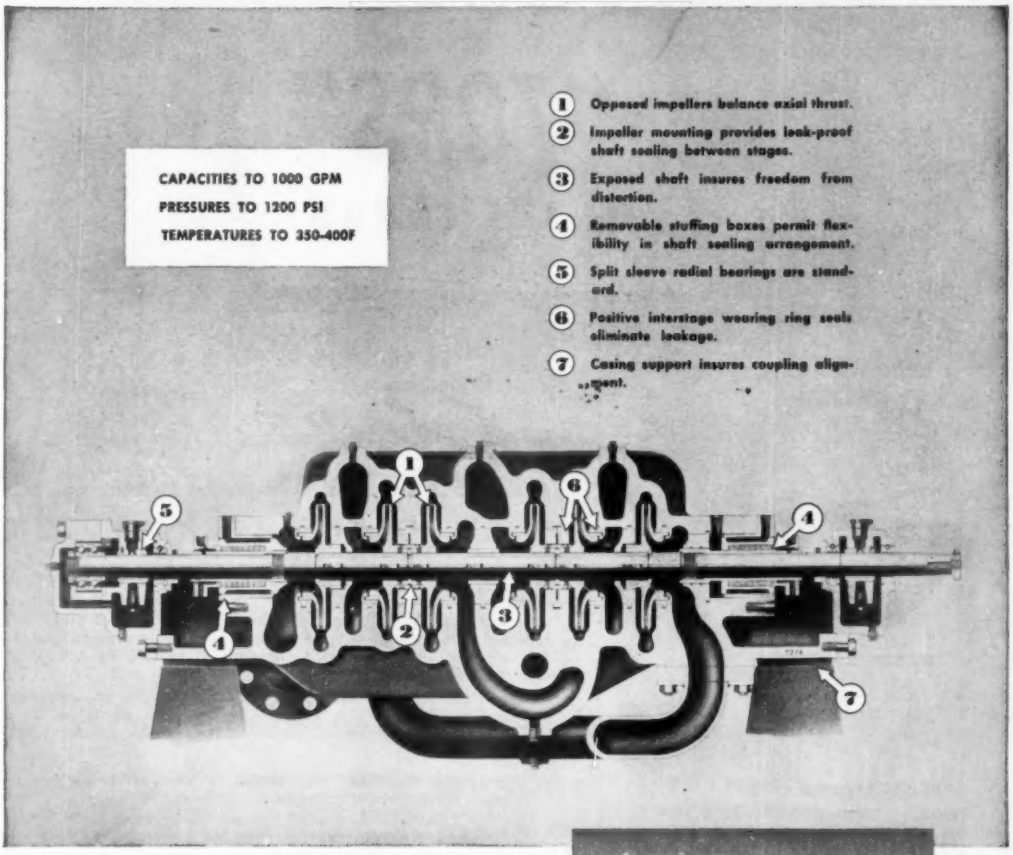
USE BAR STOCK OF	FOR RESISTANCE TO
HASTELLOY Alloy B (nickel-molybdenum-iron)	Hydrochloric acid, wet hydrogen chloride gas, sulphuric acid, phosphoric acid, organic acids, high temperatures.
HASTELLOY Alloy C (nickel-molybdenum-chromium-iron)	Nitric acid, free chlorine, acid salts, hydrochloric acid, sulphuric acid, phosphoric acid, organic acids, sulphurous acid, high temperatures.
MULTIMET Alloy (cobalt-chromium-nickel-iron)	Oxidation, high temperatures.
HAYNES Alloy No. 25 (cobalt-chromium-tungsten-nickel)	Oxidation, high temperatures, carburization, wet chlorine, nitric acid.

HAYNES
TRADE-MARK
alloys

"Haynes," "Hastelloy," and "Multimet" are trade-marks of Union Carbide and Carbon Corporation.

Haynes Stellite Company
A Division of
Union Carbide and Carbon Corporation
UCC
General Offices and Works, Kokomo, Indiana
Sales Offices
Chicago — Cleveland — Detroit — Houston
Los Angeles — New York — San Francisco — Tulsa

Simplicity, long life, easy maintenance


CAPACITIES TO 1000 GPM
PRESSURES TO 1200 PSI
TEMPERATURES TO 350-400F
1 Opposed impellers balance axial thrust.
2 Impeller mounting provides leak-proof shaft sealing between stages.
3 Exposed shaft insures freedom from distortion.
4 Removable stuffing boxes permit flexibility in shaft sealing arrangement.
5 Split sleeve radial bearings are standard.
6 Positive interstage wearing ring seals eliminate leakage.
7 Casing support insures coupling alignment.

You get them all with...

DE LAVAL

OPPELLER PUMPS

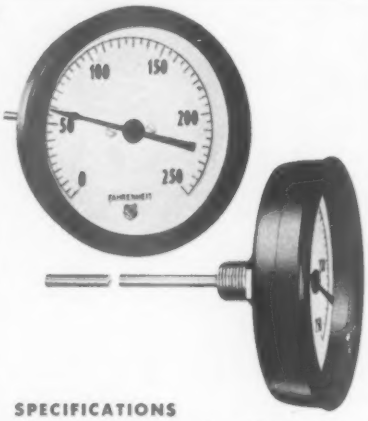
Look at the seven outstanding features shown in the cross-section and you'll see why De Laval Refinery Pumps stay on the line for years...trim maintenance costs. Use these pumps for service up to approximately 1,000 gpm and 1,200 psi with temperature up to 350-400F. They can handle liquids ranging from propane to strong caustic. Write today for bulletin giving full application and specification data.

DE LAVAL *Refinery Pumps*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DLT44

"TOPS" IN ITS CLASS



SPECIFICATIONS

Temperature Ranges: From minus 60° to 1000° F.
Dial Sizes: 3½" and 5". Graduations over full 270° arc.
Case: Aluminum alloy with smooth, black enamel instrument finish.
Bezel: Screwed to case.
Front: Heavy plate glass set in channeled gasket — hermetically seals the case.
Pointer: Adjustable type attached with set screw; easy to get at for setting.
Connection: Fixed, ½" N.P.T.
Separable Sockets: Available for use in closed systems or where the measured medium is corrosive to the stainless steel stem. Fit over all standard stem lengths except 2½".

Accurate

AMERICAN BI-METAL DIAL THERMOMETER

Accurate "on the spot" temperature readings are easy — *even from a distance* — when you use the American Bi-Metal Dial Thermometer. Installations in refineries, chemical and other process plants, and power stations have proved it ideal for locations where other types would not be nearly so practical. Furthermore, the cost is low compared to that of a distant reading thermometer.

Aside from precision manufacture and guaranteed accuracy within 1% of the scale range, the American Bi-Metal Dial Thermometer gives you these outstanding construction features:

POINTER "FLUTTER" PREVENTED by the use of a dampening fluid in the fixed stem which also houses the highly sensitive bi-metal element.

STAINLESS STEEL STEM WELDED AT BOTH ENDS. Prevents processing media from entering the case. Corrosion-resistant — helps prolong the life of the instrument.

CASE HERMETICALLY SEALED. In extensive laboratory and field tests, submersion, hot blasts, severe mechanical and thermal shocks, dust, hot gases and long exposure to the elements could not impair the accuracy of this rugged thermometer or destroy the hermetic seal.

For the best solution to your "on the spot" temperature reading problems, choose accurate American Bi-Metal Dial Thermometers. Installation is easy, fast and economical — only a ½" or ¾" N.P.T. tapped hole is required. Bulletin 144 contains complete details.

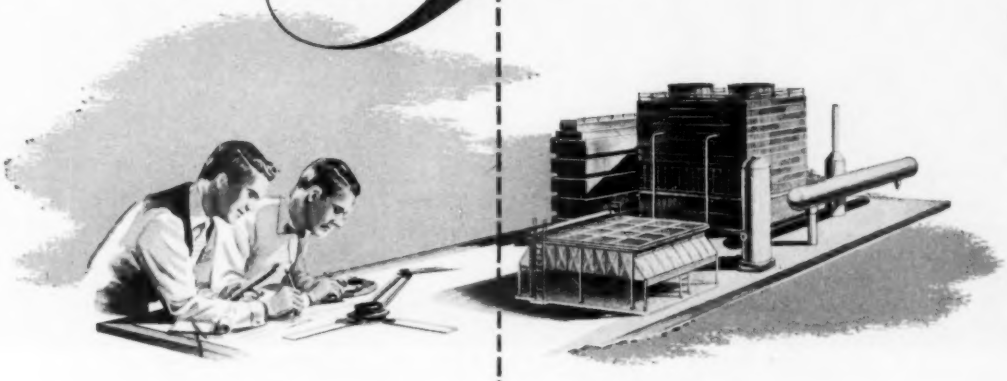
LONG EXPERIENCE with the requirements of industry in his area makes your Distributor fully qualified to give you expert counsel and to make quick deliveries from warehouse stocks. Make use of his many money-saving services.

AMERICAN INDUSTRIAL INSTRUMENTS

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

BE SURE WITH *Fluor*



IN ENGINEERING AND CONSTRUCTION

Fluor's Engineering and Construction Division is a complete organization for the development of process methods, mechanical design, equipment procurement, field erection and initial operation of plants and facilities for the oil, gas-gasoline, chemical, power and allied industries.

IN MANUFACTURED PRODUCTS

Fluor's manufactured products include Aerator and Counterflo Cooling Towers, Fin-Fan Air-Cooled Heat Exchangers, Pulsation Dampeners, Mufflers, Gas Cleaners and related equipment. Second to none in quality or performance, Fluor products are in service in petroleum, chemical and power installations throughout the world.

You are invited to write for complete information on any or all phases of Fluor's operations.

BE SURE WITH **FLUOR**

THE FLUOR CORPORATION, LTD.
LOS ANGELES 22, CALIFORNIA

FOREIGN: FACTS-FLUOR-PARIS
FLUOR OF CANADA-TORONTO
FLUOR INTERNATIONAL-BEIRUT
HEAD WRIGHTSON-LONDON

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MANUFACTURERS

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BOSTON
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SAN FRANCISCO
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BIRMINGHAM
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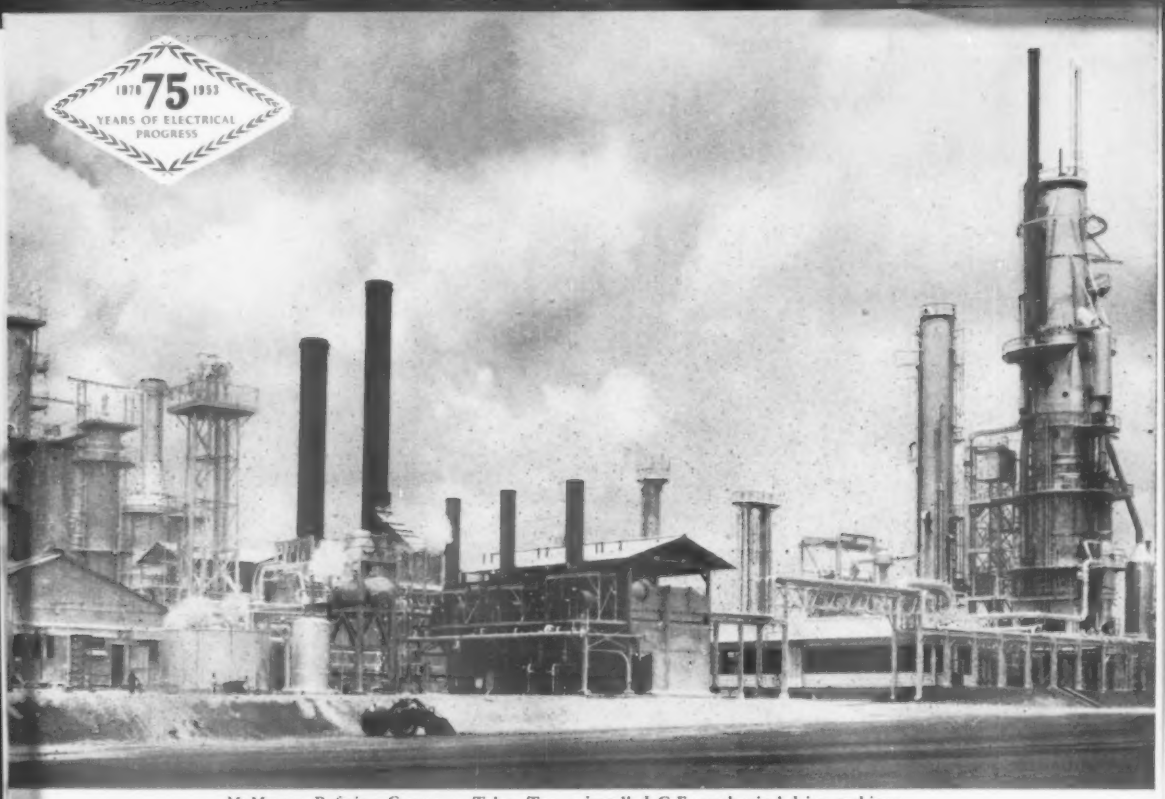
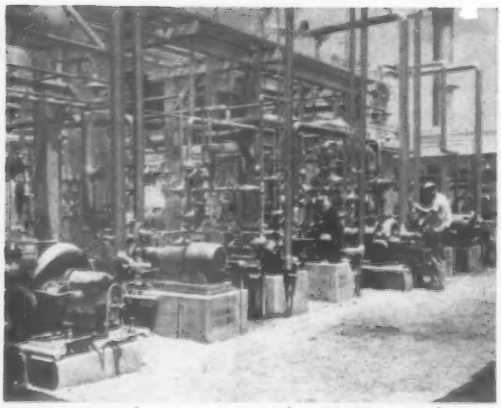
1878 75 1953
YEARS OF ELECTRICAL PROGRESS

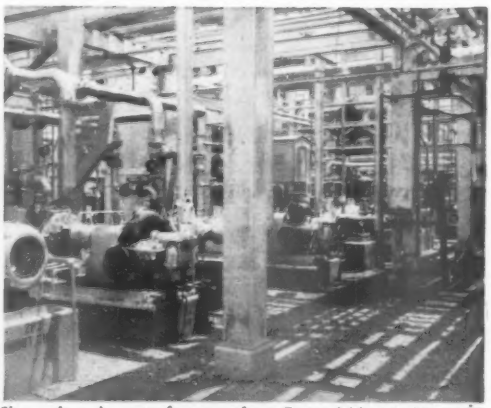


McMurrey Refining Company, Tyler, Texas, installed G-E mechanical-drive turbines throughout their plant to help assure continuous capacity output of 5000 bbls. per day.

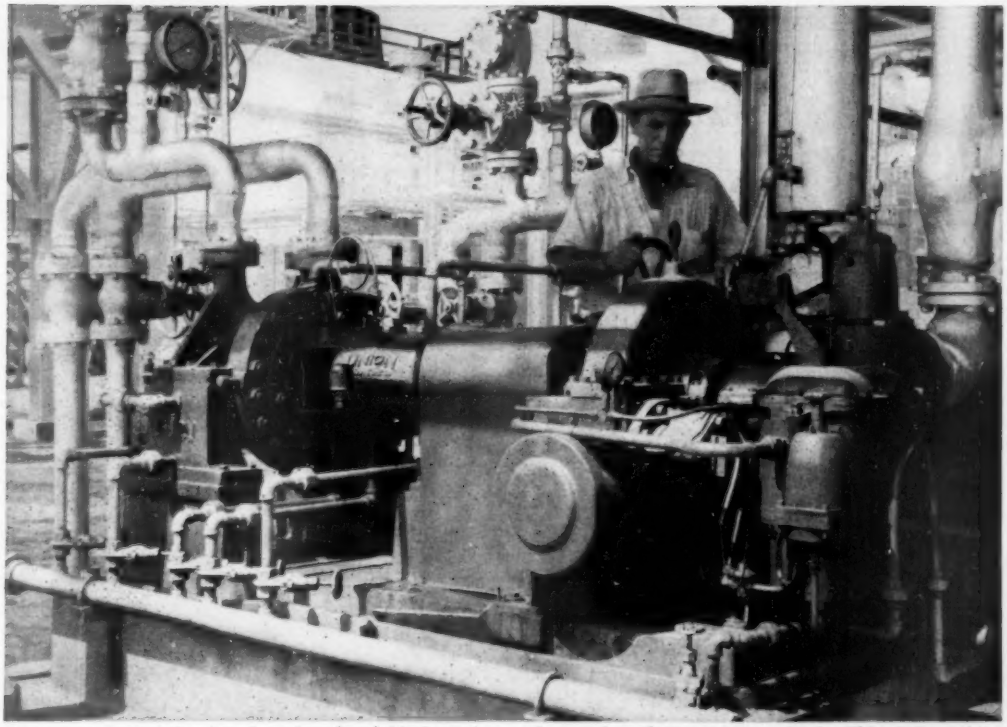
G-E Turbines Save Maintenance,



G-E turbines and motors are paired at McMurrey Refinery to utilize large steam supply efficiently. When process steam demands decrease, surplus steam is economically diverted to turbine drives. These Type DP turbines range from 8 hp to 41 hp.



Shown here is part of a row of ten General Electric Type DP turbine drives and motors, ranging from 9 hp to 48 hp. The many interchangeable parts on these turbines make stocking of spare parts an economical matter.



Maintenance personnel at the refinery have found this General Electric Type DP mechanical-drive turbine, like the many others at the refinery, easy to maintain. This 47-hp turbine at McMurrey Refinery drives a boiler-feed water pump.

Inventory Costs at McMurrey Refinery

Installed to improve steam balance, G-E standard turbines, with many interchangeable parts, also cut inventory costs.

The McMurrey Refinery, Tyler, Texas installed General Electric mechanical-drive turbines to help regulate steam balance. Since process steam demands range from 30% to 70% of available supply, surplus steam is economically diverted to turbine drives.

Time soon proved the many other advantages of G-E turbine drives which were especially designed for the petroleum industry. Mr. Dave Hood, Mechanical Maintenance Foreman at the refinery, states, "With these turbines on the line now for over a year, we're happy to report that they are extremely easy and economical to maintain, requiring very little of our time for maintenance."

Mr. Hood also said, "Since we have quite a few different sizes and ratings of turbines here, we're particularly pleased with the great number of interchangeable parts on these turbines. It certainly cuts down our inventory problem." Interchangeability of a great majority of the replaceable parts (regardless of hp rating) is a big feature with G-E standard turbine drives, which are paired with motors throughout the refinery to help assure uninterrupted service.

Call in your G-E sales-engineer or write for bulletin GEA-4955A, "A New Standard in Mechanical-drive Turbines." Section 252-58, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

The treatment of drilling mud with Sodium Tetraphosphate is an important contribution to the petroleum industry

The companies listed below are among those which have acquired immunity under U. S. Patent No. 2,361,760 for the use of Sodium Tetraphosphate in drilling mud.

BAROID SALES DIVISION—NATIONAL LEAD COMPANY
HOUSTON OIL FIELD MATERIAL COMPANY, INC.
R. G. HUBBELL CO.
INDIAN DRILLING MUD CO., INC.
MAGNET COVE BARIUM CORPORATION.

Licenses and immunities available from

TEXACO DEVELOPMENT CORPORATION

A Subsidiary of The Texas Company

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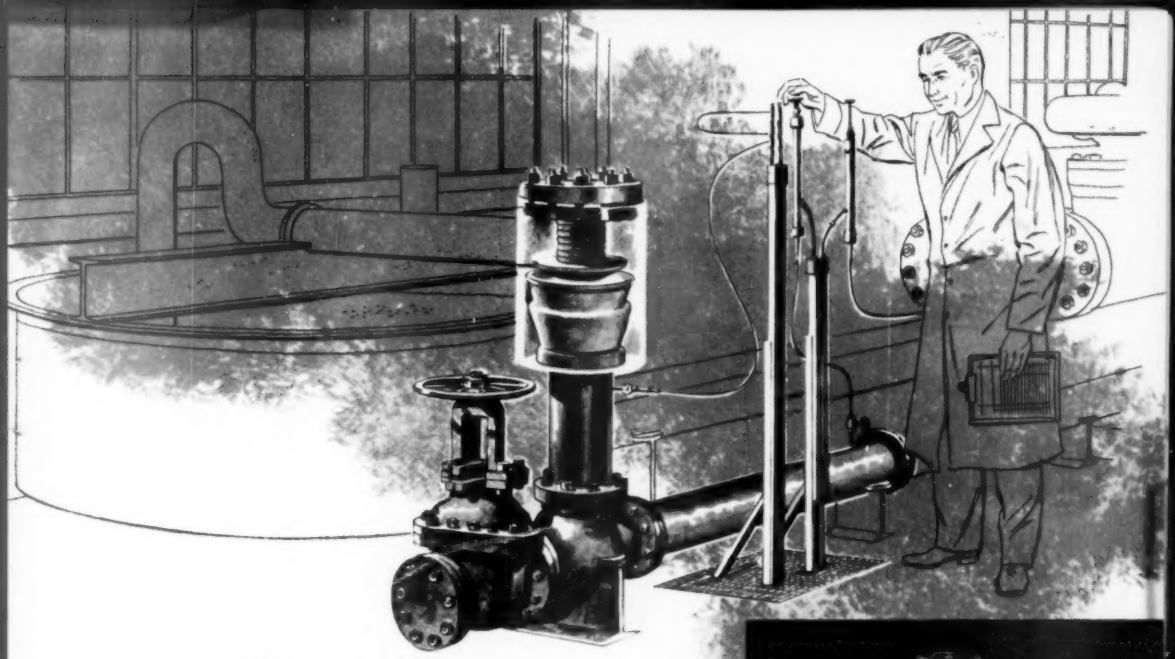


Flow Efficiency of a **PUMP VALVE**

Now the inside story is out

The inside story of flow efficiency in slush pump valves came to light during a series of experiments with valve designs.

These experiments are routine events in the continuing program of research and product development at National Supply. In conducting them, the engineers put all types of National Supply equipment through rigid performance tests under conditions more severe than are usually found in the oilfields.

When drillers talked about getting longer service out of slush pump valves, National engineers took a long look at one, operating in full view in a valve pot of clear plastic. They watched the action of the fluid, checked the flow pressure variations from one side of the valve to the other with recording instruments.

And, they found that *drillers may be sacrificing all-important flow efficiency in their pumps for relatively unimportant increases in valve service life.*

Since the individual operator must be his own final judge and jury on the question of flow efficiency versus pump valve service life, the tests conducted by National Supply may help drillers find their own best solution to the problem.

Other tests by National Supply, in the laboratory and in the oilfields, resulted in the development of a whole array of new equipment to be shown for the first time at Tulsa in May. Be sure to stop at the National exhibit.

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

NATIONAL BLUE PRODUCTS

FROM MUD MIXING

TO DEEPEST DRILLING

You'll get real ***flow efficiency*** *with*

IDEAL® SLUSH PUMPS

Mud technology has gone a long way since the drillers at Spindletop drove a herd of cattle into a water pit to churn up a gooey mess of "drilling fluid."

And IDEAL SLUSH PUMPS have progressed, too—in size, in number, and in flow efficiency. Today there are seven sizes—a completely integrated family for every drilling requirement.

As a result of the growing demand for additional pump capacity, National Supply engineers also developed, in addition to this full line of pumps, a complete range of drive group combinations and independent pump drives. Because they're built to work together these pump and drive assemblies, powered by Superior Drilling Engines, will function efficiently in all types of drilling operations.

Here are a few of the important features and characteristics of "IDEAL" Slush Pumps and related equipment—

- Pump capacities range from 50 up to 700 hydraulic horsepower output.
- Independent pump drives can be arranged with single or two-speed drives.
- Single or multiple engine application with a choice of hydraulic or mechanical drive—Ideal Gyrol, torque converter or airflex clutch.
- Pumps or pump combinations with ample pressure and mud circulating capacity for jet drilling.
- All equipment is constructed for sectionalized assembly so that slush pump systems can be readily handled with the usual field equipment.

Write for detailed bulletins on "IDEAL" Slush Pumps, Pump Drives, and related equipment.

THE NATIONAL SUPPLY COMPANY

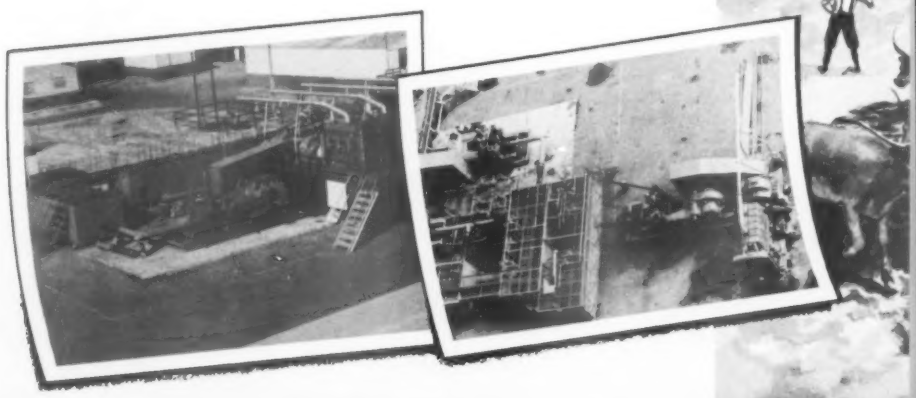
PITTSBURGH 30, PENNSYLVANIA

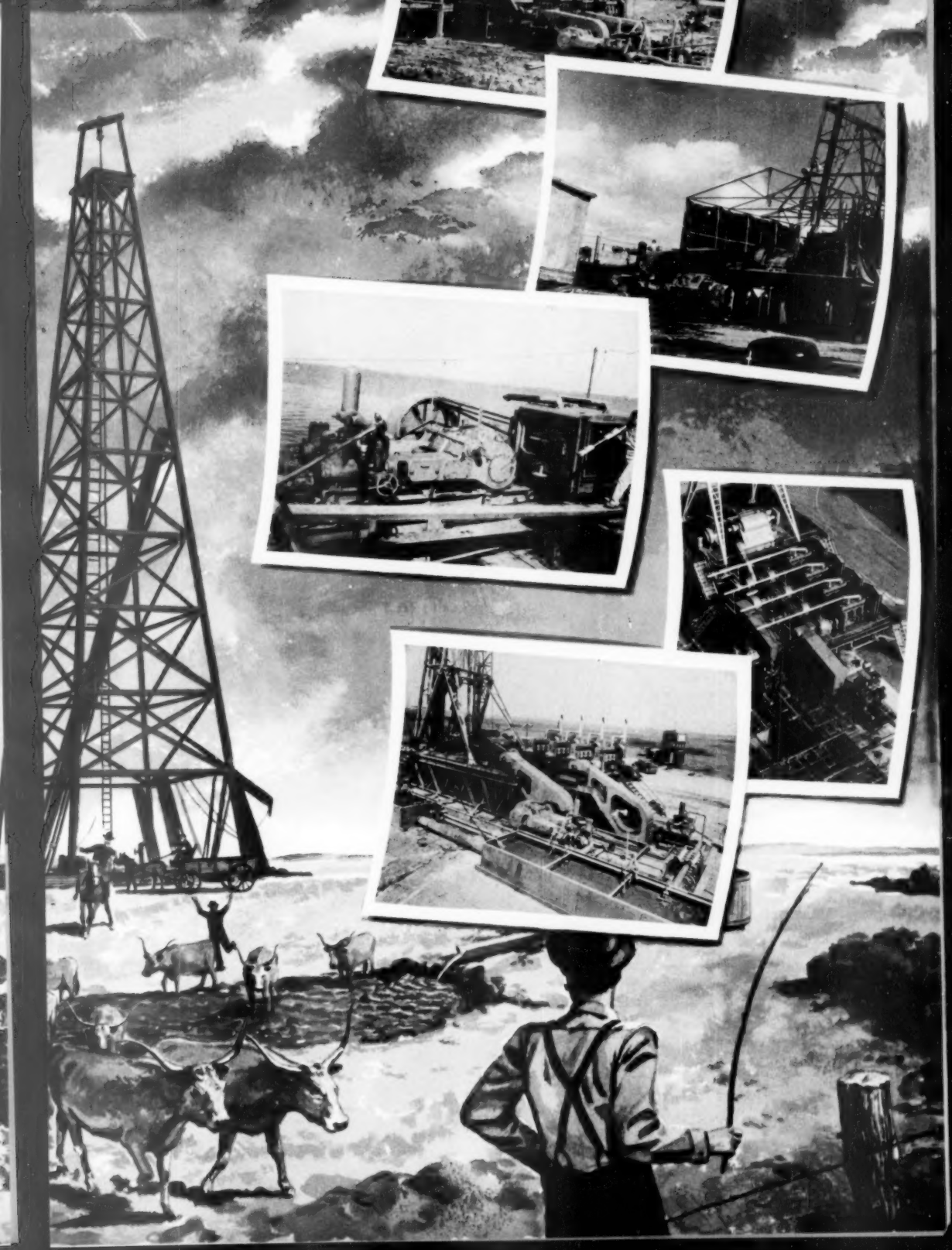
DIVISION OFFICES: Casper • Ft. Worth • Houston • Pittsburgh • Tulsa • Torrance

CANADA: The National Supply Company, Ltd., 2nd Floor F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London, E.C.2

NATIONAL BLUE PRODUCTS





Maintain the flow efficiency
of your Slush Pumps with
IDEAL FLUID END PARTS
Every National Supply Store has a complete stock of these "IDEAL" Fluid End Parts so that you can obtain off-the-shelf service anytime.
You'll find "IDEAL" Fluid End Parts mighty helpful in maintaining maximum volume and velocity—maximum flow efficiency—from your pumps, whether they're "IDEAL" Slush Pumps or those of other manufacturers.
It's always good practice to standardize on "IDEAL" Fluid End Parts for your preventive maintenance program because they're so readily obtainable and so universally accepted. Ask about them next time you're in a National Supply Store.
THE NATIONAL SUPPLY COMPANY
PITTSBURGH 30, PENNSYLVANIA
DIVISION OFFICES: Casper • Ft. Worth • Houston • Pittsburgh • Tulsa • Torrance
CANADA: The National Supply Company, Ltd., 2nd Floor T. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 100 Fifth Avenue, New York 20, N.Y., U.S.A.; Rowe Plate House, 52 South Park, London, S.C.1
NATIONAL BLUE PRODUCTS

They Say—

Prophecy for Sarnia

"It is my personal opinion that Sarnia will be the scene of the greatest future refinery expansion in Canada, and although someone once referred to the gratuitous error of prophecy.

"I will go even further and predict that Sarnia will become the greatest refining center in Canada. This area will be the oil gateway to the industrial east. Pipe lines, and to a lesser extent tankers, will carry the finished products further eastward.

"Shouldn't Sarnia witness the same type of refinery expansion as other oil pipe line terminuses, such as Haifa in Israel, or Toledo in Ohio? With greater refinery capacity in Ontario, it doesn't seem illogical to reason that refined products will move eastward from Sarnia and Toronto toward the Quebec border, reversing the existing movement of products westward."

W. Harold Rea, president, Canadian Oil Cos., Ltd., addressing the Sarnia, Ont., Chamber of Commerce.

Premature Tax Program

"It is our opinion that the Nebraska State Education Association is jumping the gun in putting strong support behind a campaign to sponsor an oil and gas severance tax. The action is dangerously premature. It could result in a tragic situation in a state which is still in its swaddling clothes so far as oil and gas exploration and production are concerned."

Editorial in the Sidney (Neb.) Telegraph.

On Price-Control Removal

"The end of price controls on crude oil and most oil products will greatly encourage Texas oil and gas operators in their search for more reserves in this state. They will at least have a more realistic background for making decisions.

"However, most of us realize that only the developments in a free market will determine whether the oil and gas producer, long pressed by arbitrary price controls, will get an increased price for his product.

"The Texas producer's dilemma right now is that of having too much available oil for the current market, a fact which is reflected by buyers' nominations for the Railroad Commission's monthly hearing. This situation has been brought about to a great extent by federal Government pressure for a larger "cushion" of productive capacity between what we need for a peacetime economy and what would be needed in case of a national military emergency."

Robert F. Windfohr, president, Texas Mid-Continent Oil and Gas Association, Fort Worth.

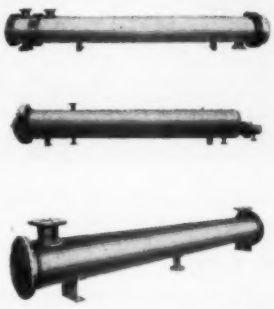
Watch Those Gas Taxes . . .

"A few years ago, there was little market for gas except as a fuel in Texas. The last decade has brought two significant developments in the use of natural gas. First markets have been built up outside of the state. Second, industrial development, particularly along the Gulf Coast, has greatly increased the use of gas.

"The state already is getting millions of tax dollars annually from the increased markets for gas. It would not be getting this money if the markets had not been developed. It will halt the continual increase in state income from gas taxes if it discourages new development because of crippling taxation. And thousands of Texas landowners will lose income that means a lot to them.

"Natural gas already is taxed at 5.72 per cent of market value. The Court of Civil Appeals at Austin has held

AND SAW A PROBLEM



A TOUGH problem . . . one of those you really like to get your teeth into! We saw a vast portion of the Petroleum Industry CONCENTRATED in the Southwest . . . yet many heat transfer sources of supply were located far from these areas of activity. At Western we set about to offer this badly needed Heat Transfer Engineering Service "close-to-home". Rating . . . designing . . . engineering . . . fabricating of Shell-and-Tube Exchangers . . . Atmospheric Sections . . . Floating Head Exchangers . . . Reboilers . . . and Telescopic Exchangers. We saw a problem . . . and licked it for YOU.

All Western Heat Exchange Equipment is fabricated to TEMA Standards.

WESTERN
HEAT EXCHANGERS
Manufactured by
WESTERN SUPPLY COMPANY
P.O. BOX 1888 TULSA, OKLAHOMA
SALES OFFICES – DALLAS – HOUSTON

the additional gathering tax of 9/20 cent per 1,000 cu. ft. to be constitutional . . . Oil, taxed at 4.5375 per cent of market value by the state, and sulfur are the only other Texas natural resources carrying such a load. Some natural resources are not taxed at all. Oil and gas alone accounted for 63.5 per cent of the total business and propery taxes collected by the state in 1950.

"To impede the industrialization of Texas by overtaxation would be like killing the fabled goose that laid the golden egg."

Editorial in Houston Post.

CALENDAR

MAR.

3- 4 Symposium on subsurface geology, University of Oklahoma.

4- 6 American Petroleum Institute, division of production, Southwestern district spring meeting, Hilton Hotel, Fort Worth.

4- 6 National Association of Corrosion Engineers, Tulsa section, fourth annual short course for pipeliners, Mayo Hotel.

8-11 American Institute of Chemical Engineers, Buena Vista Hotel, Biloxi, Miss.

15-20 American Chemical Society, petroleum division, spring meeting, Statler Hotel, Los Angeles.

16-20 National Association of Corrosion Engineers, ninth annual conference and exhibition, Hotel Sherman, Chicago.

18-20 American Petroleum Institute, division of production, Mid-Continent district meeting, Mayo Hotel, Tulsa.

23-25 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

23-26 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Sam Houston Coliseum, Houston.

23-27 Western Metal Exposition and Congress, technical sessions, Statler Hotel, Los Angeles.

25-27 Society of Automotive Engineers, national production meeting, Hotel Statler, Cleveland.

28 North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex.

30-31 Texas Independent Producers and Royalty Owners Association, annual meeting, San Antonio.

30-Apr. 1 Mid-West Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

APRIL

1- 9 American Association of Oilwell Drilling Contractors, eighth annual drilling industry safety clinic, Baker Hotel, Dallas.

7- 8 American Gas Association, research and utilization conference, Hotel Statler, Cleveland.

7- 9 Petroleum Industry Electrical Association, annual convention and exhibit, Shamrock Hotel, Houston.

8-10 American Petroleum Institute, division of production, Eastern district meeting, William Penn Hotel, Pittsburgh.

13-15 American Society of Lubricating Engineers, eigth annual meeting, Hotel Statler, Boston.

15-17 National Petroleum Association, mid-year meeting, Cleveland.

20-22 American Petroleum Institute, Division of Transportation, products pipe-line conference, Hotel Muehlebach, Kansas City.

21 Association of Consulting Chemists and Chemical Engineers, Inc., Hotel Belmont Plaza, New York City, symposium and dinner.

21-23 Southwestern Gas Measurement Short Course University of Oklahoma, Norman.

22-24 American Association of Petroleum Geologists, Rocky Mountain section meeting, Casper, Wyo.

22-24 American Institute of Electrical Engineers, southern district meeting, Hotel Seelbach, Louisville, Ky.

24-25 Interstate Oil Compact Commission, spring meeting, Roosevelt Hotel, New Orleans.

26-29 American Institute of Chemical Engineers, Chemical Institute of Canada, joint meeting, Royal York Hotel, Toronto, Ont.

27-28 Independent Petroleum Association of America, mid-year meeting, Jefferson Hotel, St. Louis.

Apr. 29-May 1 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

Apr. 30-May 1 American Gas Association, transmission and storage conference, Edgewater Beach Hotel, Chicago.

Around a cooling tower or anywhere else you've got pipe to join, the handiest, surest way to get "Flexible-Tight" joints is with Dresser Couplings or Long Sleeves.

Dressers provide the "give and take" necessary to absorb vibration, settlement and other stresses. Specially compounded rubber gaskets permit up to 4° deflection at joints—yet with Dressers, these joints stay permanently tight.

The only tool you need is a wrench—no pipe threading is necessary. Any workman can install Dressers with ease.

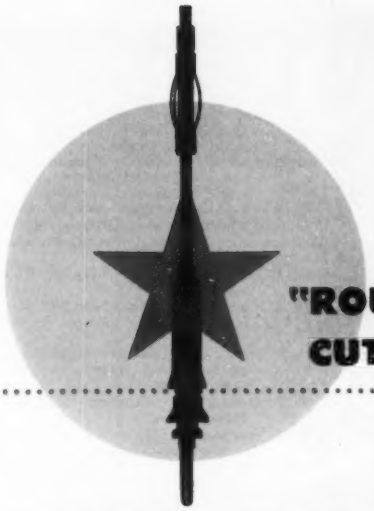
Get Dressers from your nearest supply store.

DRESSER

"FLEXIBLE-TIGHT"

COUPLINGS

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. (One of the Dresser Industries). Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Bayshore Highway, South San Francisco, California.



"ROUND TRIP" TOOL CUTS SQUEEZE TIME

HALLIBURTON'S RETRIEVABLE CEMENTER

You're back on production in the shortest possible shut-down time when you squeeze with Halliburton's Retrievable Cementer. Used in the hands of Halliburton specialists, this versatile tool can effect an important saving in rig time.

Retrievable is right. It is actually "retrieved" from the well after the job is completed, leaving nothing to be drilled out. It can spot squeeze a whole series of jobs at prelocated points, find and repair casing leaks, or perform any of its specialized tasks – and then be removed from the hole.

Under normal conditions, the Retrievable is on the bank in about an hour after the squeeze cementing job. There is no waiting for cement to set and no drilling out of the tool.

The slip body of the Halliburton Retrievable, equipped with a cup-type packing device and circulation valve, is precision-designed to withstand 8,000 to 10,000 p.s.i. The slips are actuated by applying pressure within the tubing or drill pipe. It takes about 200 p.s.i. differential pressure to set them. Additional pressure only causes the slips to grip the casing more firmly.

Backed by a quarter-century experience, Halliburton's Retrievable Cementer has solved thousands of sub-surface and remedial well problems. It may be the tool you need on your next job. Your nearby Halliburton representative can show you its advantages in minutes. Or contact Halliburton Oil Weil Cementing Company, Duncan, Oklahoma.

HALLIBURTON

YEARS AHEAD IN SQUEEZE CEMENTING!

YOURS—Built-In

MAXIMUM SAFETY

ON THE BURLINGTON'S

NEW Kansas City ZEPHYR

Interior of ZEPHYR Parlor-Dome Observation Car.

and—MAXIMUM SAFETY Everywhere with

APPLETON COUPLINGS

For Use with THIN-WALL Electric Tubing

● Grip like a vise ● Speedy in fitting

● Concrete-tight ● U-L approved ● Rain-tight

Sold Through Electrical Wholesalers Everywhere

APPLETON ELECTRIC COMPANY

1716 WELLINGTON AVENUE • CHICAGO 13, ILLINOIS

MAY

4- 5 American Petroleum Institute, division of marketing, midyear meeting, Baker Hotel, Dallas.

4- 6 Liquefied Petroleum Gas Association, annual convention, Conrad Hilton Hotel, Chicago.

5- 6 Gas hydrate control conference, University of Oklahoma, Norman.

6- 8 American Society of Training Directors, ninth annual conference, Sheraton Plaza Hotel, Boston.

7- 8 American Petroleum Institute, Rocky Mountain district, Division of Production, spring meeting, Gladstone Hotel, Casper.

11-13 Southern Gas Association, Jung Hotel, New Orleans.

11-14 American Petroleum Institute, Division of Refining, midyear meeting, New York.

13-14 Pacific Coast Gas Association, annual gas supply and transmission conference, Santa Barbara, Calif.

14-23 International Petroleum Exposition, Tulsa.

15-16 International Gas Union, council meeting, Paris, France.

19-22 The Institute of Gas Engineers, ninetieth annual meeting, London, England.

21-23 Panhandle Geological Society, field trip, Yucca Hotel, Raton, N. M.

24-27 American Gas Association, production and chemical conference, Hotel New Yorker, New York City.

25-29 American Society of Mechanical Engineers, annual conference and exhibit, oil and gas power division, Hotel Schroeder, Milwaukee.

27-29 Texas College of Arts and Industries, Kingsville, eighth annual short course in gas technology.

28-29 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Broadview Hotel, Wichita.

28-29 Natural Gas and Petroleum Association of Canada, London, Ont.

28-30 West Texas Geological Society, annual field trip, Marfa, Tex.

JUNE

2- 3 American Petroleum Institute, Division of Production, Pacific Coast District, Statler Hotel, Los Angeles.

4- 5 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington, Ky.

7-12 Society of Automotive Engineers, summer meeting, The Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

14-18 Canadian Gas Association, Windsor Hotel, Montreal, Canada.

15-19 American Petroleum Institute, Division of Production, midyear committee conference, Hotel William Penn, Pittsburgh.

16-19 American Welding Society, national spring technical meeting, Shamrock Hotel, Houston.

JUNE 16-JULY 2 Intensive Course and Research Conference on Phase Behavior of the Hydrocarbons, University of Michigan, College of Engineering, Ann Arbor.

18-19 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Conrad Hilton Hotel, Chicago.

18-19 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

JUNE 29-JULY 3 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

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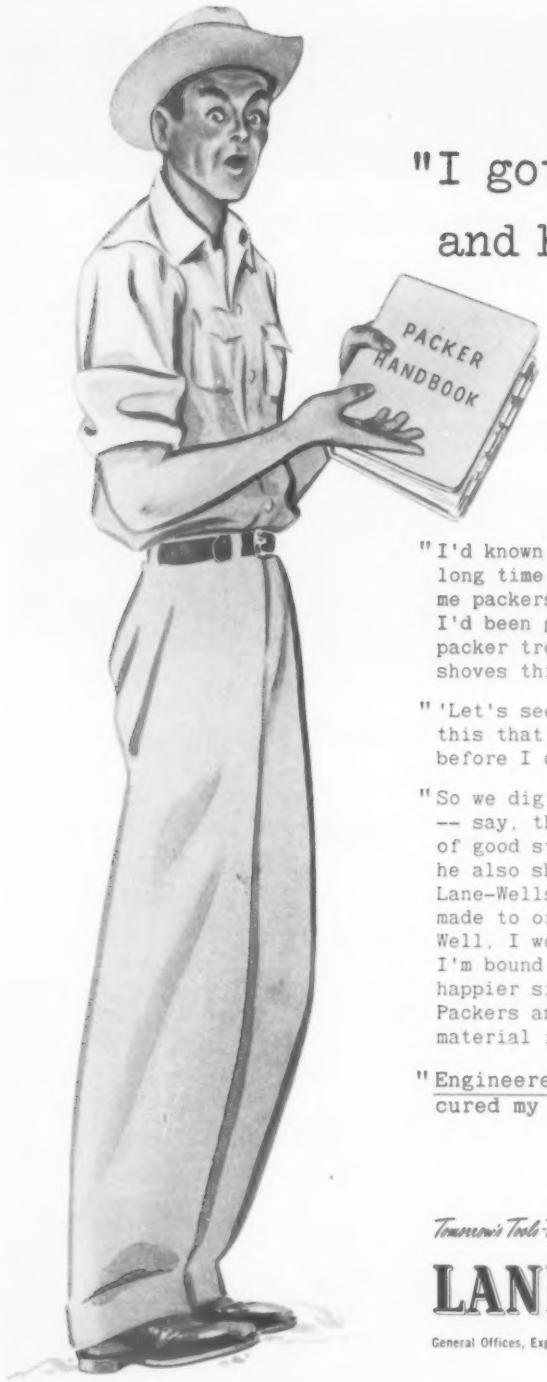

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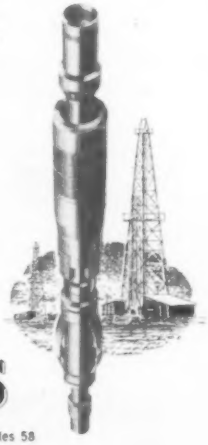

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AP-602

THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Winter Sport

WE'VE often wondered what oil men did while snowbound during the long, hard winters 'way up in northern Canada. Now we know. They play golf. Well, at least it's called golf, though the ground rules seem to be a bit different from those customary in more temperate climes.

Also, the way it was described to us it seems more like an oil show than a golf game, because all the equipment and service companies appear to have got into the act. But you can judge for yourself. This department is privileged to present the following special eye-witness account, smuggled out to us by one of our spies:

Described as a "duel," the game was played with specially forged clubs by two Edmonton men, Toby Cantwell, of Rig & Service Parts, Ltd., and Stew McKay, of Lucey Export (Canada), Ltd. About 4,000 persons braved 10° temperature, a nasty wind, and 2 ft. of snow to cheer the gladiators. A collection was taken to help European flood victims.

The game placed emphasis on speed rather than accuracy over the snow-blanketed fairways of the Edmonton Municipal Golf Course. Cantwell was declared the victor when he moved his ball 200 yards in 15 minutes. McKay was snowbound.

Had the rules committee smiled more favorably on McKay's best shot, the victory might well have been his. His drive, described as the longest ever hit in Alberta if not in the world, still hasn't been found. The ball, attached to a gas-filled balloon, last was reported by helicopter 5 miles from where it had been hit.

Thrown into the proceedings for good measure was a 100-yard horse race. Mayor Henry Veiner, 220 lb., pitted his horsemanship against Melvin Lee, oil man from Corpus Christi, Tex. Mayor Veiner became unhorsed at the halfway mark and was therefore the loser. Still unsatisfied, he again challenged the oil man and this time ran 25 yards on foot faster than Lee could make it on horseback.

Alberta Oil Tool Co. designed the special golf clubs for the golfers. Cantwell's club weighed 15 lb., and, being gold-covered, was transported to the course in an armored car. McKay's all-purpose club weighed 20 lb. and was equipped with an ashtray, bottle opener, coat hanger, and built-in tap for liquids.

When normal tees proved useless in deep snow, Thorson Oil Field Cementing, Ltd., poured cement tees. Golf balls were perforated by M. O. Johnston Oil Field Service, Ltd.

George E. Failing Supply Co. drilled holes in the rough for practice shots. Oilfield Instrument & Meter Service settled a dispute about the golf balls by weighing them on indicators that would handle up to 300,000 lb.

A two-way radio operated by Canadian Electronics, Ltd., kept in direct contact with the duelists for fear they would be overcome by snow blindness. Technical Enterprises, of Edmonton, provided a lighting plant in case darkness should set in. Fire-fighting expert Casey Ball stood by in case of a prairie fire.

The participants complained they needed data about snow conditions, so Rotary Sales & Service, Ltd., took a core and Chemical Geological Laboratories, Ltd., analyzed it. Eastman Oil Well Servicing, Ltd., worked out the angle of drift of the snow.

Time was called to drill for oil. Commonwealth Drilling Co., Pacific Pump, and Bennett & Emmott, Ltd., drilled into a handy snowbank and came up with a gusher—a barrel of oil concealed in the snow.

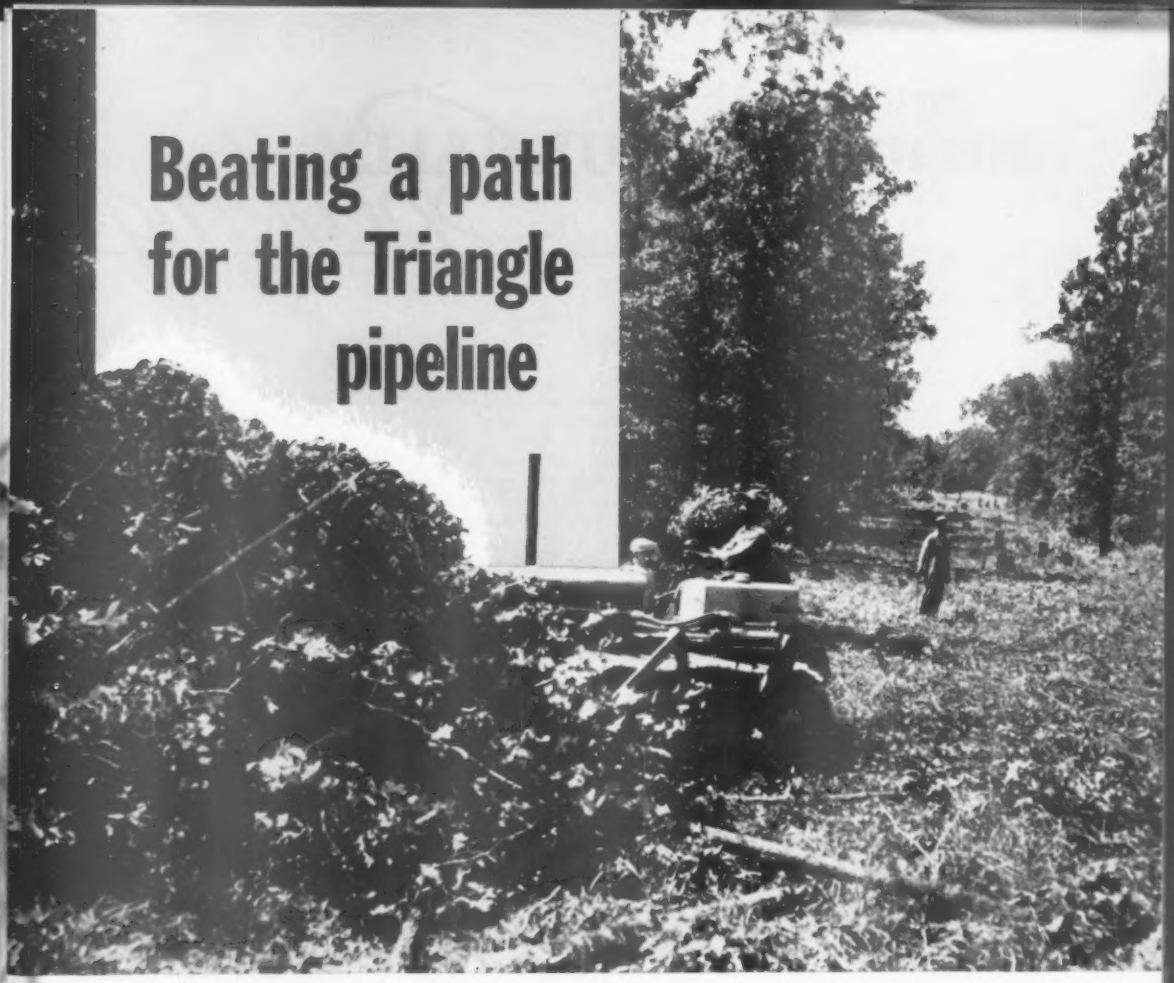
To complete proceedings, an "oil company" was formed. About 800 spectators were presented with 1,000,000 shares apiece to put them in the oil game in a big way.

Glutted Market

A FELLOW who read our recent note about Black Label Oil Co. and Crapshooter Oil Co. writes about a small company he once knew out in West Texas named Promising Oil Co. He says he thought it was pretty cute at the time, but so far as he could learn it never produced anything but promises.

Henry D. Ralph.

Beating a path for the Triangle pipeline



Between Arkansas City and Eldorado, Ark., the Triangle pipeline's right-of-way follows 84 long, tough miles over rolling hills covered with thick brush, swamp and big timber. It took plenty of punch to beat a path through that kind of country. That's why the H. C. Polk Tracting Co. of Prentiss, Miss., called in their Caterpillar Diesel D4 Tractor and Bulldozer team. This husky pair helped clear a 40-ft. right-of-way at the rate of a mile and a half a day over the toughest terrain.

The D4 delivers 43 drawbar HP and 48 belt HP. Its 4-cylinder engine has a maximum drawbar pull of 10,600 lbs. And it idles easily, too—no sputtering because there's no fouling, even with inexpensive non-premium fuels. The D4's rugged final drive has crown shaved gears, mud-proof seals and tapered splines. Its tracks and roller frames are built to last, with diagonal braces that keep tracks in line, yet leave them free to oscillate.

The No. 4S Bulldozer matches the power output of the D4 Diesel Tractor. Its side arms are of tough box section construction; its curved blade is of special high tensile steel. Even the end bits are of alloy steel specially treated for long, tough wear.

The D4 and No. 4S Bulldozer make a powerful, compact unit for right-of-way clearing on any pipeline job. And remember, wherever that pipeline goes, there's a Caterpillar Dealer nearby to furnish the service and the parts that guarantee you the genuine Caterpillar quality that's built into every one of these big yellow machines.

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Water flooding is "acres of diamonds"

THE high cost of discovering new oil pools is a reason frequently given for the current great interest in water flooding and other means of getting more oil out of old fields.

All over the country, operators are giving increased attention to methods for increasing the production of fields no longer flush. Some companies are concentrating on this much more than on exploration. This is a practical application of the old "acres of diamonds" philosophy—the policy of looking for wealth in your own back yard.

It proves the argument of conservationists that waste will be avoided when it becomes profitable to save, and that we will never "run out of oil" if there are economic incentives to develop secondary sources when and as flush production fails to meet all demands.

To this extent the nation is a gainer from the present cost discrepancy between primary discovery and secondary recovery. We are getting oil that might have been lost forever if a flood of flush production had discouraged efficient recovery, as happened so often in past decades.

BUT this comfort is deceptive and temporary. For if the price of oil should be very long below the cost, by and large, of discovering and developing new fields, the nation's producible reserves will fall off dangerously. Secondary reserves are large, but definitely limited, and little flexibility is possible in their rate of production.

Moreover, secondary recovery is not "cheap oil", even though at the moment some of it may be put on the market at lower cost than some flush production. Many technically sound secondary-recovery projects are too expensive to pay out at present prices, and all such projects need the assurance of a steady price level.

MUCH is being said, with justice, about the need for higher crude prices to stimulate oil finding. The recent growth of water-flood projects calls attention to the fact that price is also the most important factor in secondary recovery and other conservation practices which increase the nation's fuel supplies.

It will require both high prices and new techniques to produce liquid fuels commercially from shale, coal, tar sands, and similar potential sources. But in our already drilled and partially depleted oil fields we have tremendous reserves which can be produced by established methods. All that is needed is the stimulus of a slight stiffening in crude prices.

The cheapest and surest way for the nation to assure itself of adequate oil supplies is to accept the small price increase needed to make more secondary-recovery projects profitable.

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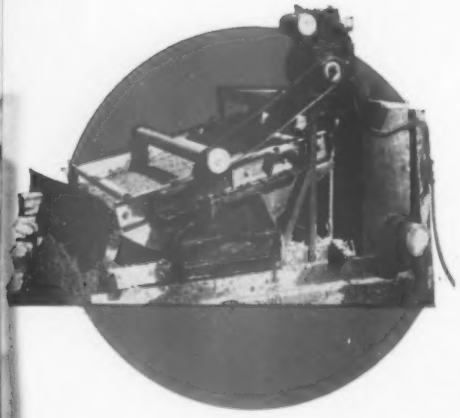

● The shale shaker does an important job in keeping the drilling mud in proper condition...assuring control of the properties and qualities of mud at all times.

There's a parallel in controlling the properties of cements. This modern feeder (lower photo) continuously weighs out the exact amounts of quality raw materials...assurance that the finished cements will be uniform and possess the desired properties...performance to meet the exacting demands of oil-field service, today and tomorrow.

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THIS WEEK

INTERNATIONAL.—Former Arabian American president proposes a Pan-Arabian highway connecting oil areas of the Persian Gulf with ports on the eastern Mediterranean. . . . Project would operate on a toll basis through an authority created by six member states. . . . Highway would be longer than Tapline's 1,068 miles, laid at a cost of more than $200,000,000. . . . ¶No hope seen in current negotiations between United States and Iran. . . . Basic dispute now is over British and American insistence that compensation for nationalized properties be determined by an international tribunal.

TRENDS.—Better gasoline markets and soft fuel markets have boosted refinery yields of gasoline this winter. . . . Current reports indicate an average yield of about 43.8 per cent since the first of November. . . . Yield for same period a year ago was about 42.3 per cent. . . . Yield in same months of 1946-47 winter was 40.2 per cent. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,440,200 bbl. daily for week ended February 21, down 3,450 bbl. daily. . . . Total well completions for the week gained 104 wells to 936. . . . Wildcat completions decreased 7 wells to 197. . . . A total of 2,426 rotary rigs were operating in United States on February 23, down 20 rigs from previous week and 274 rigs below total for corresponding date last year. . . .

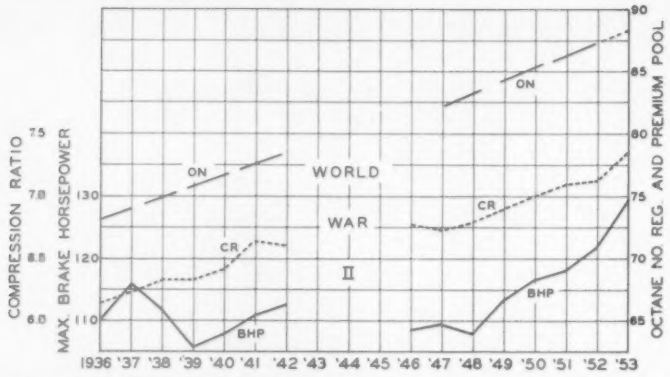
NEW DRILLING METHOD was tried with this Dominion Drilling Co. rig in Alberta. The company spudded its test on the flat, snow-covered surface of Beaverhill lake, 30 miles southeast of Edmonton. A check showed the lake frozen solid, so the company spread 10 in. of sand, topped by matting, to keep the rig heat from melting the ice, and rigged up. To keep drilling mud or vapors from the hole from melting the surrounding ice, the company ran 30 ft. of special 30-in. surface pipe, then insulated this by cementing in 30 ft. of 20-in. pipe, providing a dead air space between the strings.

REFINING.—Synthetic fuels still are too costly to constitute competition with petroleum-derived fuels, industry committee reports to NPC. . . . Oil shale bears watching by industry, but expensive government demonstration plants aren't warranted, committee says. . . . ¶Pressure for higher octane numbers indicated by new automobile engines, which have much higher compression ratios and maximum brake horsepower ratings. . . . Average compression ratio is up from 7.113 to 1 in 1952 to 7.35 to 1 in 1953. . . .

NATURAL GAS.—Third Civil Court of Appeals in Austin refuses a new hearing on three law suits challenging the constitutionality of Texas' 1½-year-old natural-gas gathering tax. . . . Pipe-line companies expected to appeal to Supreme Court. . . . ¶Texas Railroad Commission summons operators in the Spraberry trend to show cause why the area should not be shut in to conserve what the commission terms "tremendous volumes of gas" now being flared.

SECONDARY RECOVERY.—Texas Railroad Commission approves plans for huge pressure-maintenance project in Goldsmith field of West Texas. . . . Unit operation will involve 557 wells, 18,240 acres. . . . Both water and gas will be injected into 4,200-ft. San Andres reservoir. . . . ¶Scurry unit operation goes into effect. . . . Actual injection of water and gas awaits approval of field rules by Railroad Commission. . . . ¶Tex Harvey Oil Co. given permission to carry out second experimental water-imbibition secondary-recovery test. . . .

INDUSTRY.—Spokesmen for two independent-producer groups flay importing companies for "supplanting not supplementing" domestic production with imported oil. . . . TIPRO head calls for voluntary cut of 250,000 bbl. daily. . . . ¶Industry may be offered Government's synthetic-rubber plants this year. . . . Asking price reportedly will be in excess of $350,000,000. . . . ¶Bill proposing membership for Wyoming in the Interstate Oil Compact Commission passes both houses of the state legislature. . . . ¶Standard of California takes over operations in Arizona and eastern half of Utah from its subsidiary, The California Co. . . . Activities in Oklahoma are assigned to Standard Oil Co. of Texas. . . .



ALTHOUGH COMPRESSION RATIOS and horsepower ratings generally have increased in new passenger car models each year, this year's crop shows the highest average rise in history in both specifications. The curves represent the arithmetical averages of compression ratio and maximum brake horsepower of all models offered each year. The octane curve represents the weighted pool research number of both regular and premium grades of motor gasoline.

More Octane Pressure

Higher compression ratios, horsepower ratings of new 1953 autos expected to add to clamor for higher octane numbers

George Weber

ADDITIONAL pressure for higher octane numbers for both regular and premium grades of motor fuel is clearly indicated from the engine specifications of the new 1953 passenger cars offered in this country.

A survey of all companies shows the sharpest annual rise yet recorded in both compression ratios and in maximum brake horsepower ratings.

Of 38 chassis models offered this year, 19 show higher compression ratios than the corresponding 1952 models, and 17 remain unchanged. Three 1952 models were discontinued, and two new ones were introduced.

Rise in ratio . . . As shown in the accompanying table, arithmetical averages of all chassis models offered this year and last, show a rise from 7.13:1 to 7.35:1 in compression ratios on standard models. Several manufacturers offering automatic transmissions as optional, also take advantage of the higher engine-operating speeds to increase compression ratios on cars so equipped.

Last year, 47.4 per cent of all United States passenger cars sold domestically, were equipped with automatic transmissions, and the percentage is expected to exceed 50 per cent easily this year. Hence the optional compression ratios listed for many cars will hold for a majority of units produced this year, and the actual average will be higher than that for standard models. Including all standard and optional models, the average compression ratio for 1953 stands as 7.42:1 compared with 7.19:1 for 1952.

The highest compression ratio this year is in the Buick models 50 and 70, both with Dynaflow. These models also show the greatest jump in ratio, but the 1953 engine is completely new in design and incorporates some added "mechanical octanes," according to the manufacturer. In most other cases, however, the increase in compression ratio was unaccompanied by any other alterations in engine design and represents a proportional increase in octane requirements. It is also noted that ratios were increased on cars designed to operate on both regular and premium gasoline grades.

Horsepower race . . . The horsepower race closely follows the higher trend in compression ratios. This year, for the first time, two stock cars, the Cadillac and the Lincoln, exceed 200 b.hp. Buick, Chrysler, and Packard are close behind with models developing 180 or more brake horsepower. In answer to the criticism being leveled at the automotive industry for indulging in this horsepower race, engineers declare that the tremendous accelerating capacity is needed to contend with the increasing traffic hazards now encountered by the average motorist.

Complete data are not available on the expected mileage from 1953 passenger cars. It also is too early to determine what the octane requirements of many of the new models will be in the hands of some drivers. Due to engine deposition, the compression ratio and octane needs of new cars rise sharply during the first few thousand miles. In some cases, particularly in the higher compression range, the octane requirements of a new car will rise as much as 15 research numbers during the first 10,000 miles.

Octanes . . . In January, the national weighted average of premium-grade gasoline stood at 91.5 research octane numbers, regular grade at 85.1. This compares with a national average of 91.3 for premium and 84.8 for regular in September.

Presently, weighted average research octane numbers stand at 92.5 for premium and 87.5 for regular along the East Coast, and 92.5 for premium and 85.5 for regular on the Gulf Coast. It appears that the automotive industry has taken full advantage of the upward octane trends of the past year and that the demand for even higher octanes will continue to be voiced by owners of most new 1953 cars.

The construction of catalytic cracking and reforming facilities now under way and projected indicates that the petroleum industry will maintain its potential for producing successively higher-octane gasoline for the next several years.

In Case You Missed These . . .

• ENGINEERS AND MANAGEMENT—What the oil company and its engineers expect of each other, and how the professional engineer may improve himself. Article appeared January 19.

• ABC'S OF SUPERVISION—How to be a good oil-company supervisor and how to avoid being a poor one. This is "must" reading for presidents, junior engineers, field and plant foremen, drillers, and line employes. Article appeared February 16.

. . . WRITE The Oil and Gas Journal, Box 1260, Tulsa, for free reprints.

Engineering Features of United States Passenger Cars Offered in 1952 and 1953

Make and model—	No. of cylinders	Cubic-inch displacement		Compression ratio				Maximum brake horsepower			
				1952		1953		1952		1953	
		1952	1953	Std.	Opt.	Std.	Opt.	Std.	Opt.	Std.	Opt.
Buick:											
40	8	263.3	322.0	6.6	7.2	7.0	7.6	120	128	125	130
50	8	263.3	322.0	6.9	7.2	8.0	8.5	124	128	164	170
70	8	320.2	322.0	7.5		8.5		170		188	
Cadillac	8	331.0	331.0	7.5		8.25		190		210	
Chevrolet	6	216.5	235.5	6.6		7.1		92		108	
With Powerglide	6	235.5	235.5	6.7		7.5		105		115	
Chrysler	6	264.5	265.3	7.0		7.0		119		119	
	8	331.1	331.1	7.5		7.5		180		180	
Crosley	4	44.0		8.0	10.0			26			
DeSoto	6	250.6	250.6	7.0		7.0		116		116	
	8	276.1	276.1	7.1		7.1		160		160	
Dodge	6	230.2	230.2	7.0		7.0		103		103	
	8		241.3			7.1				140	
Ford	6	225.9	215.3	6.8		7.0		95		101	
	8	239.4	239.4	6.8		7.2		100		110	
Henry J	4	134.2	134.2	7.0		7.0		68		68	
	6	161.0	161.0	7.0		7.0		80		80	
Hudson:											
Jet	6		202.0			7.5	8.0			104	114
Wasp Deluxe	6	232.2	232.2	6.7	7.2	6.7	7.2	112	127	112	127
Wasp Super	6	262.2	262.2	6.7	7.2	6.7	7.2	127		127	
Hornet	6	308.0	308.0	7.2		7.2		145		145	
Commodore	8	254.0		6.7				128			
Kaiser	6	226.2	226.2	7.3		7.3		115		118	
Lincoln	8	336.7	317.5	7.0		8.0		154		205	
Mercury	8	255.4	255.4	7.2		7.2		125		125	
Nash:											
Rambler	6	172.6	184.0	7.25		7.25		82		85	
Statesman	6	195.6	195.6	7.1		7.3		88		90	
Ambassador	6	252.6	252.6	7.3		7.3	8.1	120		120	140
Oldsmobile:											
88	8	303.7	303.7	7.5		8.0		145		150	
Super 88	8	303.7	303.7	7.5		8.0		160		165	
98	8	303.7	303.7	7.5		8.0		160		165	
Packard:											
200	8	288.0	288.0	7.0		7.7		135		150	
250	8	327.0		7.0				150			
300	8	327.0	327.0	7.0		8.0		150		180	
400	8	327.0	327.0	7.8		8.0		155		180	
Plymouth	6	217.8	217.8	7.0		7.1		97		100	
Pontiac	6	239.2	239.2	6.8	7.1	7.0	7.7	100	115	115	118
	8	268.4	268.4	6.8	7.1	6.8	7.7	118	122	118	125
Studebaker:											
Champion	6	169.6	169.6	7.0		7.0	7.5	85		85	
Commander	8	232.6	232.6	7.0		7.0	7.5	120		120	
Willys	6	161.0	161.0	7.6		6.9	7.6	90		75	90
Average				7.13		7.35		120.7		129.5	

A recent survey indicated that the industry will be prepared to add one research octane number to gasoline pool each year for the next 3 years. The incentive to do so will depend on factors impossible to forecast except in general. A soft gasoline market may induce some refiners to raise octanes to maintain gallonage, thus touching off competitive quality improvement. Economists are agreed that projected capacity over the near future is more than adequate to care for the estimated demand. This will tend to sustain octane rises from a competitive standpoint and also will permit greater flexibility in refinery operations to improve motor-fuel quality.

ROCKY MOUNTAIN

Wyoming to Join Compact

CHEYENNE, Wyo.—A bill proposing membership for Wyoming in the Interstate Oil Compact Commission has passed both houses of the state legislature.

All that remains before the bill becomes a law is the governor's signature.

Legislative action is pending, according to the I.C.C., providing for membership of North Dakota and Nebraska in the compact.

Wyoming's entry brings total membership in the compact to 21. In addition two states, which do not yet have oil or gas production, are associate members.

Dakota Senate Votes Tax

BISMARCK.—The North Dakota Senate has passed a gross production tax of 5¾ per cent on crude oil produced in the state. The vote favoring the tax was 25 to 24.

A bill favoring a 25 per cent depletion allowance for state income tax purposes was also passed by the upper house. The senate also adopted a bill allowing taxation of severed mineral interest, providing that those interests be taxed on an ad valorem basis.

DIRECT COMMUNICATION with the district office is provided field service units through Dowell's two-way radio. Here M. M. Adams, service engineer, reports in to his base station at Hominy, Okla.

FIELD ENGINEERS' questions can be answered immediately. C. H. Hickman, at the Great Bend, Kans., base station, discusses a problem with a service engineer.

Cost-Cutting Radio

Dowell finds two-way FM units in base stations, trucks, and cars provides cheaper, yet more efficient operations

C. Malcolm Davis

TULSA.—Operating and maintenance costs have been cut substantially by Dowell Incorporated through the use of FM two-way radio in its field operations.

One of the largest oil-well servicing companies, Dowell now has 39 base stations and 250 mobile units equipped with two-way radio facilities and is planning to install more.

The company figures that direct communication with its field service units reduces the average time required for each job by eliminating unnecessary trips back to district headquarters, by the ability to direct a service unit to another job as one is finished, and providing greater all-around flexibility in its field setup.

This time saving, according to C. M. Bryant, Dowell's chief development engineer, has permitted the company to greatly expand its operations without increasing the number of trucks, cars, and engineers it requires. This saving in capital outlay and overhead is increased by further savings in truck maintenance, cost of associated equipment, office paper work, and other similar expenses.

Dowell's equipment . . . The company, with its present widespread use of radio, is the largest oil-field-service user of the special industrial radio license.

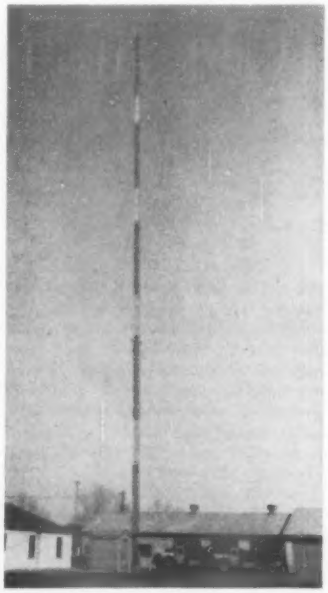
The two-way radios are leased for a 5-year period from General Electric Co. At the end of a 4-year period, Dowell has the opportunity either to buy the equipment for its existing value, request newer and more up-to-date equipment, if available, or to lease present equipment for the next period of years at a reduced rate.

It costs $600 to equip a car with a two-way radio and from $6,000 to $8,000 for a tower and the two-way radio at a station, according to Bryant. The mobile units for cars consist of a 60-watt transmitter and receiving set. The base station consists of a 250-watt transmitter and receiving set with its tower and accessories. Installations in cars and stations are identical for the whole system.

District locations . . . At present there are nine districts of the company serviced by FM radio with as many as six base stations and as few as one station to a district (see map). Each station has an operational area of 60 miles. There are 20 to 40 radio-equipped cars per district, depending upon its size and activity. FM operation in the Houston district will start in early summer.

The servicing points of Williston and Tioga, N. D.; Glendive, Mont.; Sterling, Colo.; and Vernal, Utah, are proposed for installation of two-way radio facilities in the near future.

Future oil-field servicing is to be set up by the company along with two-



TYPICAL TOWER is this one at Great Bend, duplicated at base stations all over the country.

RADIO NETWORKS of Dowell Incorporated are shown on this map. Black dots represent base stations. Line connections represent individual districts. Circled dots on Gulf Coast show stations now under construction. Dots along Canadian border circled twice are stations now planned.

way radio installations at Worland and Casper, Wyo., and Shelley and Billings, Mont.

Maintenance . . . A local radio service man is available for each station to maintain and repair the radio sets when required. However, these men receive special training from J. H. Roberts who is in charge of radio maintenance for Dowell with headquarters at Tulsa. He travels through the operating areas frequently.

Radio's utility . . . Dowell has found that the needless movement of heavy equipment can be minimized by the two-way communication. In Wichita Falls, for example, the location of each truck is pinpointed on a map. Whereas formerly it might have been necessary at times to drive as much as 150 miles to locate a service unit, periodic reports now keep the district office informed of each truck's exact location.

If a service truck arrives at a well before it is needed, it is sometimes possible to send the truck elsewhere to take care of an urgent request during what normally would be dead time.

In the event also, for example, that a truck operating out of Graham, Tex., should finish with a treatment at a time when the Gainesville office were out of trucks and in need of a service unit, the Graham truck could be dispatched to serve the Gainesville customer.

The company also has found that much time has been saved in cases of hard-to-locate leases by giving specific directions to the driver by radio.

Special installation . . . In West Texas, where distances are great, the Midland district uses a Cessna 170 equipped with a Motorola Handitalkie portable unit. This plane-to-car and plane-to-station communication system has added substantially to the efficiency of district operations, the company said.

Phase-Behavior Course Set

ANN ARBOR, Mich.—An intensive course and research conference on phase behavior of hydrocarbons will be conducted early this summer by the University of Michigan's college of engineering. The course is scheduled for June 13-30 and the conference on July 1 and 2.

Four principal subjects will be studied in the course: phase rule and its application to hydrocarbon systems; separation of azeotropic mixtures, the underlying principles of nonideal solutions and calculations made for designing fractionating systems; low-temperature processing, a review of the data available and applications to the separation of liquids from natural gases at low temperatures; and phase behavior in petroleum reservoirs, a study of techniques and data available for treating reservoir systems at high pressures.

Big System Talked

Coast operators say they plan two big-inch gas lines

HOUSTON.—Plans for a huge natural-gas system which would move gas from South Texas and South Louisiana to St. Louis, Chicago, Detroit, Cleveland, and Philadelphia were outlined here last week.

J. O. Mack, who with H. S. Mack and Al Kleinkaus, announced plans for the system, said two 30-in. lines, each with a capacity of 450,000,000 cu. ft., plus coastal gathering systems would be built.

Mack, however, refused to disclose who had committed gas reserves to the line, who had agreed to purchase the gas, or what arrangements have been made for financing the project. These details, he said, would be divulged in the operators' application to the Federal Power Commission, which will be filed, he said, "within 60 days."

As outlined by Mack, the project would involve a 30-in. line beginning in Brooks County, Texas, with branches into Starr, Hidalgo, Willacy, Cameron, Duval, Kennedy, and Live Oak counties.

The second 30-in. line would originate in the delta area, taking gas from Louisian's offshore and coastal areas. The two 30-in. lines would meet between Montgomery, Ala., and Paducah, Ky., and continue northward.

Industry Briefs

NEW YORK.—Certificates of management excellence for 1952 have been awarded 12 oil companies by the American Institute of Management. The companies are Continental Oil Co., Humble Oil & Refining Co., Creole Petroleum Corp., Gulf Oil Corp., Ohio Oil Co., Phillips Petroleum Co., Socony-Vacuum Oil Co., Inc., Standard Oil Co. (N. J.), Standard Oil Co. of California, Standard Oil Co. (Ohio), and Sun Oil Co. All received the award for the third consecutive year except for Creole, which received its first. The A.I.M. is a nonprofit foundation

devoted to improvement of corporate policies and practices.

TYLER, Tex.—The Texas Co. has been fined $25,000 in Federal District Court here on 15 charges of illegal oil production. The company had pleaded nolo contendere. The Government had accused the company of producing 468,757 bbl. of crude from its Pierce Estate lease in Wharton County to make up the difference between allowables and production in other wells on the lease.

HARRISBURG.—Two bills proposing taxes on the sale of natural gas and on the operation of pipe lines have been introduced in the Pennsylvania House of Representatives. The natural-gas levy would bring in 7 cents per M.c.f. or fraction of M.c.f. The other measure would tax pipe lines $100 per mile annually for 20-in. pipe or bigger, $70 for 15 to 20-in., $50 for 12 to 15-in., and $30 for all pipe less than 12-in. in diameter. All revenue of the taxes would be used to redeem veterans' bonus bonds.

LOS ANGELES.—Standard Oil Co. of California has taken over from its subsidiary, The California Co., operations in Arizona and the eastern half of Utah. The change was effective March 1. Operations of The California Co. in Oklahoma were assigned to Standard Oil Co. of Texas.

Importers Criticized

Lyons says high imports rate dangerous to domestic oil industry; Payne asks voluntary 250,000-bbl. reduction

AUSTIN.—Fears that the current and planned rate of imports represent a danger to the domestic producer were expressed by two independent-producer groups following the imports hearing conducted by the Texas Railroad Commission.

Charlton H. Lyons, Shreveport, president of the Independent Petroleum Association of America, in a prepared statement said figures submitted to the Railroad Commission by the major importing companies "indicate conclusively that imports have passed the danger point."

Bryan W. Payne, president of the Texas Independent Producers and Royalty Owners Association, in a similar statement said he was "surprised and shocked that a handful of American oil importing companies, in the face of their public avowals to supplement but not supplant domestic production, now are proposing actually to increase the quantity of oil and products they are bringing in from their more profitable foreign holdings."

High rate "harmful" . . . Reports of the importing companies to the commission showed that 12 major importing companies plan 1953 crude-oil imports averaging 637,914 bbl. daily. Average product imports, reported by nine companies, were set at 258,998 bbl. daily *(The Oil and Gas Journal, February 23, page 131).*

Lyons said that these figures of the major companies, together with estimates for all other companies, "indicate that foreign oil will come into this country at the approximate rate of 1,100,000 bbl. daily in 1953."

This, he said, would be an increase of 16 per cent over 1952, an increase, he said, which "would prove extremely harmful to the domestic oil industry at a time when we face the task of building a reserve cushion of domestic oil-production capacity for security purposes."

Voluntary cut asked . . . Payne called for an immediate cut in imports of 250,000 bbl. daily, saying that failure of importers to take this action would necessitate an appeal for help outside the industry. TIPRO's course, he said, will be determined at its annual meeting in San Antonio March 30-31.

"We must take positive and definite steps to halve the excess flow of surplus foreign oil whether we do so before the Railroad Commission, the Texas Legislature, the United States Congress, or the bar of public opinion," Payne said.

Both the I.P.A.A. and the TIPRO statement were released just after the introduction in the Texas Senate of a resolution asking each importing company to publish monthly the amount of imports brought into this country by it during the previous month.

The resolution called upon the importing companies to use "business statesmanship" and thereby protect the economy of the nation and preserve its national security.

In Austin, Ernest O. Thompson, who presided at the hearing at which the imports statements of the companies were released, later said he plans to ask the importing companies to submit a 5-month advance estimate of imports.

Blaming high aboveground stocks and high imports for the cutback in the March allowable, Thompson said he hoped the importers would cut their imports in proportion to the reduction in domestic production. This, he said, would keep imports from supplanting domestic production, which is needed for defense.

Malcolm Davis Joins Journal Editorial Staff

HOUSTON.—C. Malcolm Davis has joined the editorial staff of The Oil and Gas Journal as a district editor in the Houston office.

Davis comes to the Journal from Penn State where he was a faculty member in the petroleum-engineering department. He holds a B.S. degree in chemistry from Massachusetts Institute of Technology, an M.Ed. degree from Boston University, and has completed requirements for an M.S. degree in mechanical engineering at Missouri School of Mines.

His oil experience dates from 1937 when he joined Humble Oil & Refining Co. at Baytown, Tex., as a research chemist. In the succeeding years, Davis engaged in petroleum production and refining extension work with the University of Texas, joined E. B. Badger & Sons Co. as a chemical process engineer at Abadan, Iran; and worked with Stone & Webster Engineering Corp., as a chemical process engineer in the United States. Prior to joining Penn State, he also had served as professor of industrial chemistry at Robert College Engineering School in Istanbul, Turkey, and as professor of petroleum engineering at Missouri School of Mines, Rolla, Mo.

C. MALCOLM DAVIS

Goldsmith Plan Approved

Gas and water injection in San Andres reservoir of West Texas may push ultimate recovery to 136,000,000 bbl.

AUSTIN.—The Texas Railroad Commission has approved plans for one of the largest and most significant pressure-maintenance programs ever planned for a major West Texas oil field.

The unit-operating agreement involves injection of water and gas into the San Andres reservoir of Goldsmith field, Ector County, Texas *(The Oil and Gas Journal, October 20, 1952, page 81)*.

The unit covers portions of 29 sections of land totaling 18,240 productive acres. At last report there were 557 wells producing from the 4,200-ft. reservoir.

Gulf Oil Corp., unit operator, estimates the investment required initially at $4,279,000. Gulf controls 78.50 per cent of the unit area. It is joined in the project by Phillips Petroleum Co. and Pure Oil Co., each controlling 10.75 per cent of the unit area.

Commission ruling . . . The commission gave blanket permission to Gulf to use any of the wells in the unit for injection and to transfer the allowables of injection wells to others. It imposed a net gas-oil ratio limit of 2,000 to 1. The order permits as much as 600,000 M.c.f. of over-injected gas to be carried forward as a gas bank, which will be eliminated each October 1, if it is not used. The usual monthly reports are required to obtain credit for injected gas.

Gulf engineers said they believe less than one-fourth of the oil in place in the unit area has been recovered since the field was discovered in 1934.

Production from the reservoir totals about 68,000,000 bbl., and it is thought that the secondary-recovery project may push ultimate recovery to about twice this amount.

Bottom-hole pressure of the reservoir has fallen 624 psi. since the discovery to about 1,088 psi. The pressure-maintenance program is expected to stabilize the pressure at approximately 1,000 psi.

Injection . . . Gulf plans to obtain injection water from Hendrick field, 30 miles west in Winkler County. The company will drill 6 water wells to move about 60,000 to 90,000 bbl. of water daily through a big-inch line to Goldsmith. The water will be reinjected into the San Andres reservoir through 31 wells—20 of them converted from existing oil wells, the other 11 to be drilled on the edge of field. The resulting periphery flood is expected to drive oil updip to producing wells.

Gulf will convert four present producing wells on the crest of the gas cap to gas-injection service. From 5,000 to 10,000 M.c.f. of gas daily will be introduced above the field's 140-ft.-plus oil column through a broad gas cap which overlies much of the field. Residue gas for injection will come from Phillips' Goldsmith gasoline plant nearby.

Big Unit in Effect

But actual injection will await field-rules approval

SNYDER, Tex.—The world's biggest unit operation, the secondary-recovery project in Kelly-Snyder and Diamond M fields of Scurry County, Texas, became effective March 1.

At midnight February 28, companies operating in the fields lost their identity as individual operators as ownership of their wells passed to the Scurry Area Canyon Reef Operators Committee, and each operator became a part owner of all of the more than 1,200 wells in the 47,000-acre unitized area.

Actual injection of water and gas into the producing formation is not scheduled to get under way for several weeks, since the Texas Railroad Commission first must approve field rules governing the injection operations. A hearing on rules proposed for the unit was set by the commission for March 11 but is expected to be postponed to give the unit operators more time in which to select input wells and draw up field rules.

A SACROC spokesman said that injection operations probably will be started "within 24 hours" after the rules are approved. The main water-supply and gas-supply lines already have been completed into the unit area, and lines to the injection wells will be laid after these wells are designated.

Four compressors to be used in the gas-injection operation already have been installed. Water pumps will be installed after the water-injection wells are picked.

Unitization of the huge producing area was reported by the commission the first week in February *(The Oil and Gas Journal, February 9, page 74)*. The project is expected by SACROC engineers to result in an ultimate production of 720,000,000 bbl. more oil than would have been obtained by primary-recovery methods.

Imbibition Test Approved

AUSTIN.—Authority to carry out an experimental water-imbibition displacement test in the Tex-Harvey area of the Spraberry in Midland and Glasscock counties, West Texas, has been granted Tex-Harvey Oil Co. by the Texas Railroad Commission.

The company plans to inject salt water into the Floyd sand through its No.'s 1, 3, and 7 wells in Section 15. It has permission of the commission to transfer allowables of the injection wells to any other wells producing from the same reservoir on the same lease.

The commission's order designated the project as an experimental area, thus permitting its operation on lease allowables and without gas-oil-ratio restrictions.

Way Down South

Southernmost drilling well in the United States is Sinclair Oil & Gas Co.'s 1 H. R. Williams on Key Largo in 24-59s-40e, Monroe County, Florida, about 40 miles south of Miami. The wildcat, now drilling below 4,006 ft. is scheduled to check 10,500 ft. of South Florida's dominantly calcareous section, which has yielded only one oil field to date.

Tex-Harvey's project will be the second to test the imbibition method of secondary recovery with Spraberry. Atlantic Refining Co. now is well under way on a pilot test in the upper Spraberry formation under its W. M. Schrock lease in Driver field, also in Glasscock County *(The Oil and Gas Journal, January 12, page 67)*. Water injection at Driver was begun November 20 last year. Laboratory experiments conducted by Atlantic with Spraberry cores indicated that the method would result in recovery of about three times the amount of oil expected by natural-displacement recovery.

Spraberry Showdown Set

AUSTIN. — The Texas Railroad Commission has summoned operators in the Spraberry Trend to appear at a hearing here March 17 to show cause why the area should not be shut in to conserve what the commission termed "tremendous volumes of gas" now being flared in the Trend.

The commission claims about 250,000,000 cu. ft. of gas daily is being flared and vented on leases and at gasoline plants in the area, based on inspections by its engineers.

Gas production in the Spraberry, the commission reports, is about 330,000,000 cu. ft. daily, reflecting that only a small portion of the daily production is being utilized.

Oil, Gas Bills Delayed

AUSTIN.—Bills of direct interest to the oil and gas industry are moving slowly in the current session of the Texas Legislature.

None of the tax bills have been set for public hearing, and it is believed that none will be heard until the appropriations bills are out of committee about the middle of April.

These tax bills include a natural-gas-processing tax of 1 cent per M.c.f. to replace or supplement the gathering tax now tied up in the courts, a processing tax of 1 cent per gallon on the manufacture of combustible condensates either from crude or natural gas, a horsepower tax on engines driving natural-gas compressors of $60 annually per horsepower, and a tax which would levy on dedication of gas under contract *(The Oil and Gas Journal, February 2, page 33)*.

Likewise, sponsors of two minimum gas-price bills in each house have not yet requested hearings. These are the measures providing for the setting of minimum prices in Panhandle-Hugoton field to compare favorably with those in the Oklahoma portion of the field and the ones giving the railroad commission authority to set minimum wellhead prices over the state generally as a means of preventing or reducing waste.

Tax Case Rehearing Denied

AUSTIN.—The Third Court of Civil Appeals last week refused a new hearing on three lawsuits challenging the constitutionality of the state's 1½-year-old gathering tax on natural-gas pipeline companies.

The action paved the way for the pipe-line companies too appeal to the Texas Supreme Court.

Rejected by the appellate court were motions for the rehearing by Panhandle Eastern Pipe Line Co., Michigan-Wisconsin Pipe Line Co., and Amarillo Oil Co.

The appellate court earlier had upheld the constitutionality of the tax statute, overruling a lower court which had held in favor of the companies *(The Oil and Gas Journal, February 9, page 74)*. The suits are expected to land eventually in the U. S. Supreme Court.

South Cowden Leases Sold

TULSA.—Sunray Oil Corp. and Atlas Corp. have purchased two oil leases totaling 640 acres and producing 1,700 bbl. daily in South Cowden field, Ector County, Texas. Sunray will operate the leases and has a call on the production. The property was sold by the heirs of Vina Bagley, Odessa, Tex. It includes the 160-acre Colbert lease and the 480-acre Emmons lease. There are 14 producing wells and eight proven inside-development locations.

ECONOMICS

Imports Hit Peak

Total shipments in December average 1,212,000 bbl. daily, 170,000 bbl. daily over previous high set in October 1952

IMPORTS of crude and petroleum products reached an all-time high in December, according to data compiled and released by the Census Bureau of the Department of Commerce.

Total imports into the continental United States averaged 1,212,000 bbl. daily compared with 920,000 bbl. daily in November and 790,000 bbl. daily in December 1951. The previous high was in October 1952, when total imports reached 1,042,000 bbl. daily.

Crude imports in December averaged 650,000 bbl. daily for a gain of 90,000 bbl. daily over November and 97,000 bbl. daily over the average for the first 11 months of the year. The December figure was 3,000 bbl. daily

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	Dec. 1952	Nov. 1952	Dec.† 1951
Crude—			
Mexico	709	616	1,268
Colombia	1,335	1,121	819
Venezuela	10,108	9,609	8,193
Kuwait	3,337	1,907	1,172
Saudi Arabia	3,543	2,696	
Iraq	342		
Canada	96	63	58
Far East	671	776	325
Total crude	20,141	16,788	11,835
Daily average	650	560	382
Products—			
Residual fuel	16,681	10,436	11,980
Other products	741	364	683
Total products	17,422	10,800	12,663
Daily average	562	360	408
Total all oils	37,563	27,588	24,498
Daily average	1,212	920	790

EXPORTS*

	Dec. 1952	Nov. 1952	Dec. 1951
Crude	2,991	1,805	2,147
Gasoline	4,640	3,442	3,416
Kerosine	509	357	385
Distillate fuel	2,995	2,932	1,821
Residual fuel	1,502	1,271	2,006
Lube oils	920	961	1,430
Other products	739	834	751
Total all oils	14,296	11,602	11,956
Daily average	461	387	386

*Excludes shipments to territories. †Revised.

New Paginated Feature

INSTRUMENTS, a new Journal editorial feature, is initiated with this issue, on page 93. This page is designed to bring to the operating instrument man new ideas and procedures to help him do his job better. It is a part of the Journal's expanded coverage in the rapidly expanding instrumentation field. The page is laid out for clipping to facilitate its filing in the instrument man's operating notebook.

greater than the previous record in October.

Crude imports on the West Coast continued high, bringing the average for the last half of the year to about 62,000 bbl. daily compared with slightly less than 13,000 bbl. daily for the first half.

Product imports, mostly residual fuel, reached 562,000 bbl. daily in December for another record. This compares with the previous record of 483,000 bbl. daily, which was established in January 1951.

Exports also set mark . . . Exports of crude and products, excluding shipments to territories, averaged 461,000 bbl. daily, the highest level reached since April.

Most of the gain over November came about through larger exports of crude and gasoline. Crude exports averaged 96,500 bbl. daily compared with 49,200 bbl. daily in November. This December gain does not follow the normal trend since crude exports, as a rule, are lower in winter than during the summer months. The December total was greater than for any other month of 1952 with the exception of April.

Gasoline exports, reported for December, were higher even than in the period immediately following the closing of the refinery at Abadan in Iran. The peak for that period was 134,000 bbl. daily in September 1951. The December average was 149,700 bbl. daily.

Secondary Stocks Up

Despite greater end-of-year drop, stocks of four major products on January 1 were higher than a year earlier

SECONDARY stocks of the four major products totaled 52,233,000 bbl. at the end of 1952, according to data compiled and released by the Census Bureau of the Department of Commerce.

The figure for December 31 represented a decrease of 3,733,000 bbl. from the total for the end of November but an increase of 2,369,000 bbl. over the closing stocks for 1951.

Most of the decrease during the month of December was in District 1. The net decrease in this district was 2,409,000 bbl. or 65 per cent of the over-all reduction for all districts. For December 1951, the decrease in District 2 was slightly larger than in District 1.

By products, the largest decrease was in stocks of distillate fuels, down 2,405,000 bbl. out of the total drop of 3,733,000 bbl. Kerosine stocks decreased 699,000 bbl. and gasoline was off 401,000 bbl. Kerosine was the only major product with smaller secondary inventories at the end of 1952 than at the end of 1951.

With data available for the last 6 months of 1952 and for 5 months in 1951, it is possible to get an idea of seasonal trends in secondary stocks for the last half of the year.

Trend to continue . . . During the months of August and September 1952, stocks increased about 5,000,000 bbl. This was followed by a decrease of about 6,000,000 bbl. from September 30 to the end of the year. The downward trend is expected to continue until secondary suppliers start building gasoline inventories near the end of the first quarter.

The reduction in distillate stocks during the month of December 1952 amounted to 2,400,000 bbl. compared with a reduction of 1,400,000 bbl. in December 1951. This greater decrease in 1952 may have been influenced by the large primary inventories of distillates.

Excessive primary stocks reduced the possibility of a distillate shortage during the heating season, and assured the secondary supplier of near-certain source of distillate on a week-to-week basis. The possibility of soft distillate markets and reduced prices tended to keep secondary stocks below peak levels.

Out of a reduction of 2,400,000 bbl. in distillate stocks in December, District 1 accounted for 1,600,000 bbl.

The Sun Wasn't Enough

Lights in the daytime were required on Kansas drilling rigs during the state's recent heavy dust storms. Lights can be seen on this rig near McPherson on strings on each side of the structure. White dots against the black foreground also are rig lights. Density of the air is shown by the faintness of the sun, which appears just below the enclosed area for the derrick man and just to the right of the guy wire.

SECONDARY STOCKS
(Thousands of barrels)

	Dec. 31, 1952	Nov. 30, 1952	Dec. 31, 1951
Gasoline:			
Dist. 1	5,341	5,875	5,509
Dist. 2	8,104	7,902	7,729
Dist. 3	3,194	3,245	2,701
Dist. 4	863	830	764
Dist. 5	2,012	2,063	1,897
Total	19,514	19,915	18,600
Kerosine:*			
Dist. 1	2,890	3,349	3,113
Dist. 2	3,458	3,664	3,568
Dist. 3	780	821	664
Dist. 4	98	93	99
Dist. 5	107	105	111
Total	7,333	8,032	7,555
Distillate:			
Dist. 1	10,062	11,616	9,267
Dist. 2	6,494	6,795	6,176
Dist. 3	914	1,300	1,144
Dist. 4	483	493	397
Dist. 5	1,150	1,304	1,226
Total	19,103	21,508	18,210
Residual:			
Dist. 1	4,044	3,907	3,658
Dist. 2	1,773	1,901	1,281
Dist. 3	300	517	529
Dist. 4	6	6	6
Dist. 5	160	180	25
Total	6,283	6,511	5,499
Major products:			
Dist. 1	22,337	24,746	21,547
Dist. 2	19,829	20,263	18,754
Dist. 3	5,188	5,883	5,038
Dist. 4	1,450	1,422	1,266
Dist. 5	3,429	3,652	3,259
Total	52,233	55,966	49,864

*Iqcludes range oil.

TRENDS IN SECONDARY STOCKS
(Millions of barrels)

	Four products		Distillate	
	1951	1952	1951	1952
July 31	(*)	53.4	(*)	17.5
Aug. 31	54.2	55.8	18.6	20.6
Sept. 30	56.1	58.3	20.9	22.7
Oct. 31	56.6	57.7	21.6	22.2
Nov. 30	53.6	56.0	19.6	21.5
Dec. 31	49.9	52.2	18.2	19.1

*Not available.

Synthetics Still Costly

Industry committee tells NPC oil shale is oil's closest competitor, but gasoline would cost 14.7 cents at refinery

Bertram F. Linz

WASHINGTON.—Costs of producing synthetic liquid fuels are so far out of line and natural petroleum is available in such volume that the need for a synthetic liquid-fuels industry is "still in the distant future," the National Petroleum Council was told last week.

On a long-term outlook, a council committee headed by W. S. S. Rodgers, chairman of The Texas Co., reported there is some likelihood of further reducing the cost of manufacturing liquid synthetic fuels by continued research in oil shale and the Fischer-Tropsch method of processing coal, but coal hydrogenation would require drastic improvements in existing methods to permit economic operation.

A committee analysis showed that gasoline manufactured from oil shale would cost 14.7 cents per gallon at the refinery, while gasoline made from coal by the Fischer-Tropsch process would cost 29.4 cents and that from hydrogenation processes "at least" 36.3 cents.

The council's report climaxed a lengthy study estimated to have cost $500,000 in which the Bureau of Mines' original cost claims were analyzed and its research program was thoroughly surveyed.

Why demonstration plants? . . . As a result of its investigation the committee questioned seriously the value of the bureau's multimillion dollar demonstration plants.

Since new techniques may be available by the time synthetic fuels are needed to supplement petroleum, the committee said, "we question the wisdom of the Government financing "large-scale demonstration plants" since the new technique can be developed from well-designed pilot plants at a small fraction of the cost.

While the committee questioned the value of further expensive work by the Government, which already has expended $74,000,000 on synthetic liquid fuels since 1944, it did not decry the eventual aim of the bureau to encourage establishment of a synthetic industry and, in fact, emphasized that "the possibility of commercial operations in oil shale warrants the continued attention of the petroleum industry."

How it figured . . . The committee pointed out that in its study the federal income-tax rate has been taken at 50 per cent of income before taxes, and no effect has been given to excess profit taxes. The derived product costs do not include sales taxes or marketing expense. Liquefied petroleum gas and a limited amount of chemicals were credited as byproducts.

Housing for construction workers and permanent employes was included to the extent necessary by the conditions prevailing at the plant sites, and the net effect of this expense on product cost was determined with due consideration of money returned to the enterprise through rentals. In eastern locations the expense would be negligible but in western locations it would add about 5 per cent to the computed cost of gasoline.

"A return of 6 per cent, after taxes, on the total investment was used in

Summary of Synthetic Liquid-Fuels Production Costs

	Fischer-Tropsch		Coal hydrogenation: Modernized	Coal hydrogenation: Conventional		Oil shale	
	Single plant	Single plant	Single plant	Single plant	Eight plants*	Single plant	Five plants*
Coal or shale:							
Tons per calendar day	7,040	17,200	11,690	12,960	112,500	76,800	384,000
Liquid products: Barrels (42 gal.) per calendar day							
Gasoline	8,710	21,380	19,490	19,490	163,830	25,380	126,900
Diesel fuel						12,200	62,360
Gas oil	1,710	4,210					
Liquefied petroleum gas	580	1,410	6,390	6,390	52,170	1,780	8,920
Residual fuel						340	3,050
Liquid chemicals			1,120	1,120			
Total liquid products	11,000	27,000	27,000	27,000	216,000	39,700	201,230
Other products:							
Coke: tons per C.D.						1,180	5,900
Fuel gas (1,060 B.t.u. per C.F.):							
Thousand standard cubic feet per C.D.						24,830	124,150
Ammonia: Tons per C.D.						92	460
Sulfur: Tons per C.D.	190	466				43	215
Manpower:							
Total men including administration	3,230	6,440	5,250	5,900	53,800	3,420	15,750
Construction steel:							
Thousands tons	89	177	196	220	1,710	178	694
Tons daily bbl. of total liquid. prod.	8.1	6.6	7.3	8.1	7.9	4.5	3.5
Construction labor:							
Million man hours	14	29	43	51	355	26	123
Investment cost:							
Millions of dollars	184	380	477	533	4,074	333	1,518
Dollars daily bbl. of total liquid prod.	16,800	14,100	17,680	19,740	18,860	8,400	7,500
Cost of gasoline with 6 per cent return on investment after income tax:							
Cents per gallon	35.7	29.4	36.3	41.4	43.5	16.2	14.7

*Centralized.

computing the gasoline cost in order to demonstrate that charges for return on the investment should be included in the calculations," the committee explained.

But, it added, "it is very doubtful that capital could be attracted to such a speculative venture at this low rate of return. Although this committee did not wish to specify the exact investment return required, since such a number would vary with individual situations, most financial authorities agree that an expected return of 12-15 per cent on the total invested capital, borrowed or equity, would be required to attract private capital."

However, it was pointed out, for each increase of 1 per cent return on the investment, after taxes, the gasoline costs from the single plant cases would increase by from 1.3 cents per gallon for oil shale to 3.6 cents per gallon for conventional coal hydrogenation.

The committee's conclusions on investment and costs of product are summarized in the accompanying table.

Rubber-Plant Sale?

Shafer plans bill to offer Government synthetic-rubber plants for sale; private firms would do better, he says

WASHINGTON. — The Government may put a "for sale" sign on its synthetic-rubber plants this year, at a price that will insure a profit on the deal.

Legislation to turn the Government's 28 plants over to private industry will be introduced in Congress by Rep. Paul W. Shafer of Michigan, author of the Rubber Act of 1948 and acknowledged leader in the field of synthetic-rubber legislation.

The probable asking price will be in excess of $350,000,000. Since all but about a third of that amount of the cost has already been amortized, the Government would stand to make a profit in excess of $250,000,000.

The government-owned rubber industry is big business. It consists of 13 copolymer plants, 2 butyl plants, 10 butadiene plants, 1 styrene plant, 1 chemical plant and a development laboratory. Rubber sales in fiscal 1952 were 746,551 long tons and receipts were $416,500,000 on which the Government made a net profit of $16,100,000.

Background . . . The synthetic industry was started in 1941 and really got under way when supplies of natural rubber from the Far East were cut off by the Japanese. After the war, some plants were closed, but the Synthetic Rubber Act was passed in 1948 to keep the Government in the business until synthetic rubber found a place in the economy which would protect the country against another interruption of natural-rubber supply.

In 1950 proposals were made for disposition of the plants but Congress ordered the plants retained another 2 years. In view of the Korean situation Congress again extended government operation last summer until March 31, 1954, but called on the President to submit recommendations regarding disposal by April 15 of this year.

Shafer concedes it may be possible to sell all the plants, particularly the alcohol-butadiene plants and one or two of the less efficient copolymer plants.

Sale proposal . . . To be fair to those who do purchase plants, he suggests that those not sold be put in standby with a definite legal restriction they may not be operated by either the Government or industry except in time of war or a national emergency.

"I think the time has come for the "Government to fish or cut bait; either sell these plants and get out of the business lock, stock and barrel, or announce to the world that we are going to continue in the synthetic rubber business until the plants become completely obsolete," Shafer declared.

"If we do not do this, we will stifle private initiative in such a way as to seriously affect our national security because private industry will not invest their own capital in new plants if they have reason to believe that the Government may turn around and sell competitive plants at a very low cost

Texaco Production Conclave

The Texas Co.'s producing committee, made up of members of the Texaco and affiliated firms' production staffs from over the United States, Canada, Venezuela, and Colombia, assembled for its annual meeting in New York last month. They are (seated, left to right): J. H. Rambin, Jr., manager of Louisiana Division, New Orleans; S. A. Berthiaume, assistant to general manager, Houston; A. R. Wilson, assistant general manager, Houston; E. R. Filley, vice president, New York; R. F. Baker, executive vice president, New York; J. N. Troxell, general manager, Houston; J. C. Brooks, assistant to general manager, Houston; C. B. Williams, manager of West Texas Division, Fort Worth; A. W. Baucum, assistant to vice president, New York; (standing, left to right) J. O. Bower, manager of Colombian Division, Texas Petroleum Co., Bogota, Colombia; J. H. Puls, manager of Pacific Coast Division, Los Angeles; E. M. Jacobs, department agent, Houston; G. Herzog, director of research, Bellaire, Tex.; M. L. Terry, manager of Oklahoma Division, Tulsa; D. L. Harlan, chief petroleum engineer, Houston; W. V. Vietti, manager of Gas Division, Houston; R. L. Lay, manager of Geophysical Division, Houston; T. T. Freeman, manager of Rocky Mountain Division, Denver; W. A. Clark, general manager of Foreign Producing Department, New York; T. W. G. Thomson, manager of Texaco Exploration Co., Calgary, Alta.; G. M. Clement, chief geologist, Houston; B. M. Miller, staff geologist, New York; L. T. Tighe, manager of South Texas Division, Houston; H. H. Arnold, Jr., vice president of California Texas Oil Co., Ltd., New York; G. A. Severson, assistant manager of Venezuelan Division, Texas Petroleum Co., Caracas, Venezuela; L. J. Whetsell, director of industrial relations, Houston; W. J. Hanley, New York staff; H. Brunjes, New York staff; A. C. Hunter, assistant to general manager, New York.

shortly after private industry has expended huge sums on constructing new facilities."

Tidelands Action Urged

WASHINGTON.—The Eisenhower administration's pledge to return their tidelands to the states was translated into legislative proposals last week.

Interior Secretary Douglas McKay proposed to the Senate Interior Committee that Congress enact a "one package" law returning to the states the submerged lands lying within their "historical" boundaries and establishing a procedure to encourage development of the Continental Shelf seaward of those boundaries.

Secretary of the Navy Robert Anderson, who followed McKay before the committee, also urged that the controversy be settled quickly but made no special recommendation for recognition of state titles.

FPC Asks More Power

WASHINGTON.—The Federal Power Commission asked Congress last week for new authority in the field of natural gas.

Most of the recommendations would deal with such matters as security issues, certain types of gas sales, interconnection of facilities and hearing procedures, but the commission also asked for two broad grants of authority.

The FPC recommended that Section 14 (A) of the Natural Gas Act be amended to give it broad investigatory powers with respect to the gas industry similar to those now conferred on it with respect to the electric industry by the Federal Power Act.

The other recommendation was for amendment of Section 3 of the law to provide that the same standards applicable to the transportation and sale of natural gas, to the extent applicable, shall be applied to the import and export of natural gas, including authority to regulate rates and service in connection therewith so far as operations within the United States are concerned.

Air Base Land to Be Leased

WASHINGTON. — Approximately 1,900 acres of oil-bearing land in the Barksdale, La., air force base have been turned over to the Interior Department for leasing to protect the deposits from drainage by wells on adjacent private lands.

Any leases granted will be subject to special restrictions regarding entry on adjacent lands, etc., to protect the normal operations on the air base.

WATCHING WASHINGTON

Bertram F. Linz

Attack on Imports

Independent oil producers and refiners and representatives of labor and management from the railroad and coal industries will meet in Washington this week to map a drive for enactment of legislation by Congress limiting imports of residual fuel oil to 5 per cent of domestic consumption.

With the tidelands question expected to be settled within a matter of weeks, imports has again become an outstanding oil issue. About 20 bills were introduced last month by congressmen from the coal-producing states, all calling for a limitation on residual imports. The question of quotas was raised by the Independent Petroleum Association of America, but no legislation to that end has been introduced.

The question of tariffs already is plaguing the administration. A Tariff Commission recommendation that the import duty on briar pipes be increased to protect the domestic industry from Italian competition has been sent back to the commission by President Eisenhower with a request for further study.

The President's action is believed to have been influenced, in part at least, by a threat that if the administration indicates it will follow a protective policy by increasing the duty on pipes it would loose a flood of similar applications for relief from other industries.

New Synthetics Approach

A new approach to the problem of synthetic liquid fuels is expected to be developed soon in the Interior Department.

Secretary Douglas McKay has not yet turned his attention to the Bureau of Mines program, but when he does Republican views on government in industry and the demand for economy are expected to weigh heavily in evaluating it.

The bureau's research started out as a straight liquid-fuels development. When it was found that production costs were so high as to make plants out of the question, the emphasis switched to fuels-plus-chemicals, and still later to chemicals with fuels as the byproduct.

There are indications that thinking now is retracing those steps and future research will be centered on liquid fuels. One factor contributing to this reversal is the possibility that a very few plants would be able to produce enough chemicals to swamp the market but would contribute little to the oil supply.

Some observers believe the bureau's research will be narrowed down to an effort to reduce the costs of producing synthetic liquid fuels to a point where commercial production will become feasible, leaving it to private capital to build the plants with no financing by the Government.

Robertson Draws Fire

Reported selection by President Eisenhower of Jeff A. Robertson as chairman of the Federal Power Commission appears to have created some dismay in Midwest natural-gas consuming areas.

It is from that section of the country that a fight is being waged against the FPC decision holding that Phillips Petroleum Co. is not subject to its jurisdiction because of its gas operations. It is from there, also, that opposition comes to every application for increased rates filed by pipe-line companies serving the area.

The opposition to Robertson is based, in part at least, on the fact that as chairman of the Kansas Corporation Commission he has been fighting to have the FPC fix rates for the pipe-line companies based on the Kansas law putting a minimum price of 8 cents per 1,000 cu. ft. of gas sold at wells. The commission in the past has refused to recognize state conservation - law prices, although last month it ruled that evidence of field prices could be introduced in rate cases. It has fixed rates on the basis of the original cost of gas, often bought in low-cost days.

The campaign against Robertson is based on a charge that he favors natural-gas regulation based on guaranteed high returns for gas-producing states rather than to preserve low rates for industrial-area consumers. Robertson has powerful political backing, although there are other contenders for the post, including John C. Doerfer, chairman of the Wisconson Public Service Commission, and an unidentified nominee of New York, both said to be favorable to cheap gas.

Conservation Lethargy

Richfield official's blast at lack of conservation laws in California not stirring up agitation for legislation

D. H. Stormont

LOS ANGELES.—Most West Coast company officials and independents here agreed last week with Charles S. Jones, president of Richfield Oil Corp., that oil-conservation laws are needed badly in California. Apparently, however, no concerted drive for such a law will be undertaken.

Lack of conservation statutes was blamed by Jones as the cause for the recent upward swing in California crude-oil and refined-product prices. To bring the situation to the attention of the motoring public, Richfield took full-page advertisements in 149 newspapers.

With but few exceptions the reaction of industry heads was that such laws would be a good thing. There were no indications, however, that the move was gaining any headway in the industry. Even more important, the statement failed to arouse any signs of activity in the state legislature.

Likewise, there appeared to be no tendency on the part of the state's independent-producer organizations to again take up the fight—and it unquestionably would be a battle before any adequate laws are adopted, most industry officials agree.

The last attempt . . . In 1951, two leading independent groups, the Oil Producers Agency and the San Joaquin Valley Independent Producers Association, after months of spreading the need for conservation laws throughout the state, were ready to introduce a bill into the legislative hopper. Starting of the Korean war caused Governor Warren to ask that the effort be dropped in favor of more pressing matters.

Need greater now . . . As one company official pointed out, California's need for such laws is greater now than before the war, since the state's oil status has passed from one of surplus to one of shortage. Then, few fields were being produced in excess of rates set by the Conservation Committee of California, the state industry's voluntary oil-production commission.

During the past year, the committee's M.E.R. recommendations have been exceeded by approximately 25,000 bbl. daily. If allowance is made for under-production in some fields, the average probably was nearer the 40,000-bbl. mark.

Conservation frustrated . . . The need also is reflected in occasional overdrilling flurries and in the inability of operators to unitize certain fields so that pressure-maintenance programs can be started.

A recent example of the former is at Honor Rancho field northwest of Los Angeles. There The Texas Co. drilled seven wells within a strip slightly over ¼-mile long on the west edge of its lease to prevent crude being drained to wells on even more densely drilled offsetting leases.

In regard to unitization, efforts have been under way for several years at Guijarral Hills, Paloma, South Cuyama, and a few other fields. Increased oil recoveries which could result from the adoption of gas injection and the other benefits of unitized pressure maintenance cannot be obtained because minor lease and/or royalty interests refuse to enter the programs.

As one major company official commented, "Secondary recovery is possible for producing large quantities of oil, but it demands we ignore property lines. Some way should be devised so that when a substantial majority wishes to participate in such a plan they can't be blocked by one or two."

Elk Hills Problem

High-pressure water driving oil out of field, Navy told; plan now is to drill 39 more wells, increase production

WASHINGTON. — Drilling of 39 wells to increase crude production from Naval Petroleum Reserve No. 1 by 18,100 bbl. daily in an effort to halt migration of more than 5,000 bbl. daily of oil from the field is under consideration by Navy Secretary Robert Anderson.

The department's plans were disclosed last week at hearings before the House Armed Services Committee at which Capt. Robert H. Meade, director of naval petroleum reserves, and G. E. Woodward of DeGolyer and MacNaughton, explained that high-pressure water on the north appears to be driving the whole shallow zone of Elk Hills field toward a low-pressure water area on the south.

The need for action to halt the loss of oil was impressed upon the Navy Department last summer by the engineering committee representing both the Navy and Standard Oil Co. of California, part owner of the field and operator under the unit contract entered into in 1944.

The proposed wells would bring the total number in the shallow zone to 719 and, with increased production from other strategically placed wells, would bring the total output to approximately 24,000 bbl. daily of which the Navy would get eight-ninths and Standard one-ninth.

Unique problem . . . The Navy's consultants, DeGolyer and MacNaughton, advised the department that the problems encountered in Elk Hills are not known to be duplicated in any other oil field.

"Nonuniform production of the oil within the field to date and, what is much more important, the large pressure in the aquifer north of the field coupled with the low pressure in the aquifer south of the field has made a pressure unbalance within and without the oil field," it was explained. "The result of this is that water encroaches from the north and east and oil encroaches into water sands to the south."

The Elk Hills area was made a naval reserve by President Taft in 1912 and was enlarged to the north some 10 years ago when it became evident the oil extended beyond the original boundary. Some 12,000 of the 38,000 acres originally in the reserve were owned by Standard, and after the company and the Navy competed for some years in producing oil they pooled their interests in 1944.

What is involved . . . In justifying the program, which it was emphasized was accepted by former Navy Secretary Whitehair but has not been approved by Secretary Anderson, witnesses before the committee pointed out that unless corrected the loss of oil will amount to some 42,000,000 bbl. over a 10-year period with a dollar value of $73,000,000 to $85,000,000.

PLANNING COMMITTEE for the annual convention of the American Association of Petroleum Geologists, the Society of Exploration Geophysicists, and the Society of Economic Paleontologists and Mineralogists to be held in Houston, March 23-26. Left to right: Ralph Cantrell, consulting geologist, vice chairman for A.A.P.G.; Carleton D. Speed, Jr., Speed Oil Co., general chairman of the convention; Roy L. Lay, The Texas Co., vice chairman for S.E.G.; and M. B. Stephenson, Stanolind Oil & Gas Co., vice chairman for S.E.P.M.

Exploration Meet Set

Planning completed for annual joint meeting March 23-26 of S.E.G., A.A.P.G., S.E.P.M.; 6,000 expected to attend

HOUSTON.—About 6,000 exploration technologists from the United States and at least 15 foreign countries will gather here March 23-26 for the annual joint meeting of the American Association of Petroleum Geologists, the Society of Economic Paleontologists and Mineralogists, and the Society of Exploration Geophysicists.

Headquarters will be set up in both the Rice and Shamrock hotels, and all meetings will be held in the Houston Coliseum and Music Hall.

The host societies are the Houston Geological Society, headed by Ray C. Lewis, Houston Oil Co. of Texas, and the Houston section of the S.E.G., headed by E. J. Shimek of Geophysical Associates. Petroleum Exploration equipment, covering an estimated 80,000 ft. of floor space, will be exhibited in the Coliseum Annex during the convention.

The program will be as follows:

Monday, March 23 . . . Society of Exploration Geophysicists. "Good Ranch Field, Borden County, Texas," H. C. McCarver; "The MicroLog Continuous Dipmeter," Pierre de Chambrier; "Radioactivity Surveying of Shot Hole Cuttings," W. L. Morris; "Seismic Model Study," E. T. Howes, L. H. Tejada-Flores, and L. Randolph; "Management's Responsibility for Safety," G. H. Westby; "Geophysical Activity in 1952," E. A. Eckhardt.

Tuesday, March 24 . . . Joint session of three societies. Addresses by Morgan J. Davis, president of A.A.P.G.; Clifford C. Church, president of S.E.P.M.; Curtis H. Johnson, president of S.E.G.; and Robert G. Dunlop, president of Sun Oil Co. Presentation of awards and honors.

American Association of Petroleum Geologists. "Oil Discovery Trends," Paul Schultz; "Geology and the Public," Carey Croneis; "The Occurrence of Hydrocarbons in Recent Marine Sediments," P. V. Smith, Jr.; "Salt Volumes in Coastal Domes as Indicated by Gravity Data," Sigmund Hammer; "Politics Threaten World Oil Adequacy," Warren L. Baker and Don Kliewer; "Radioactive Mineral Exploration," F. H. Lahee; "Exploratory Drilling in 1952 Read by Title," F. H. Lahee.

Society of Economic Paleontologists and Mineralogists. "Continental Shelf Sediments off the West Coast of Florida," Howard R. Gould and Robert H. Stewart; "Distribution and Origin of Sediment Units in the Eastern-Mississippi Delta," Philip C. Scruton; "Shorelines of the Atchafalaya Region, Louisiana," Warren C. Thompson; "Sediment Zones Bordering the Barrier Islands of the Central Texas Coast," Francis P. Shepard and David G. Moore; "Dynamic Geology of the Modern Coastal Region, Northwest Gulf of Mexico," Alan Lohse; "Particle Size-Distribution Pattern in Near Shore Environment," Douglas L. Inman.

Society of Exploration Geophysicists. "MIT-GSI Plan," Cecil H. Green; "Problem Areas for the Seismologist," Glenn M. Conklin; "Note on the Refracted Wave in a Layer," Frank Press and Maurice Ewing; "Continuous Velocity Logging," D. R. Dobyns; "The SIE Electronic Shaking Table," Keith R. Beeman; "Stratigraphic Considerations Governing Gravity Interpretation in Utah," W. H. Fenwick; "Curved Path Delta T. Analysis," John T. Brustad.

Wednesday, March 25 . . . Joint session. "Applications of New Techniques to Basic Objectives of Paleontology," Heinz Lowenstam; "Some Recent Development in Well Logging," Loy Carter; "Facies Map Design," W. C. Krumbein and L. L. Sloss; "Geophysical Progress," Henry C. Cortes; "Aeromagnetic Anomalies Over Known Structures and Oil Fields," N. C. Steenland; "Seismograms as an Aid to Geological Interpretations in the Poza Rica Area," D. W. Rockwell and Antonio Garcia Rojas.

American Association of Petroleum Geologists. "Setting of the Gulf Geosyncline,"

Truck Radio Increases Flexibility

Reliable Service Co. has found that two-way radio in its service units has speeded up its operations and increased its flexibility. This truck, for example, shown on a Prentice field lease of Honolulu Oil Corp. in Yoakum County, Texas, can go direct to its next job without the necessity for reporting back to its headquarters, because of radio transmitted orders. Base of the vertical antenna may be seen protruding from the top of the truck cab. Radio equipment was provided by Motorola, Inc.

The New Louisiana Purchase

EVERY day America crosses a frontier—the frontier of a new market. It is the market created by an ever growing population. Since Pearl Harbor, our population has increased 23½ millions—more than all the people now living in the region west of the Mississippi once called the Louisiana purchase, that vast billion-acre area which provided us with geographical frontiers for a hundred years.

During 1952, 8,500 babies were born daily, increasing our population by nearly 3,000,000 people. New families and bigger families need more and bigger houses, more food, clothing, cars, roads, hospitals, churches, schools. Their needs call for continuing and increasing production from farms and factories.

There are those among us who say a decline in government spending will bring depression. But where is there room for depression when we add the population of another Minnesota or an Iowa to our nation each year—when the need for goods and services increases steadily? In fact, only by tapering off our vast programs of government spending can industry and business hope to provide sufficient goods to maintain our present standard of living and satisfy the demands of our ever growing population.

Let no one tell you America has crossed its last frontier.

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Harold N. Fisk; "Recent Geology of the Northern Gulf of Mexico Region," R. J. LeBlanc and Norman N. Greenman; "Stratigraphy of the Coastal Plain in Southeastern Alabama, Florida, and Georgia," Lyman Toulmin and Louise Jordan; "Geology of the Central Gulf Coastal Plain," Tom H. Philpott; "Post-Eocene Geology of the Central Gulf Coastal Plain," Leslie Bowlin; "Sedimentary Environments of the Gulf Tertiary of Texas," H. B. Stenzel.

American Association of Petroleum Geologists-Society of Exploration Geophysicists. "Evidence of the General Structure of the Gulf Coast from Geophysical Data," Paul Weaver.

Society of Exploration Geophysicists. "Wavelet Contraction, Wavelet Expansion, and the Control of Seismic Resolution," Norman Ricker; "Aerial Shooting for Seismic Exploration," J. J. Jakosky; "A Velocity Function Including Lithologic Variation," L. Y. Faust; "Ghost Reflection Caused by Energy First Reflected Above the Level of the Shot," F. A. Van Melle and K. R. Weatherburn.

Society of Economic Palentologists and Mineralogists. "Age or Biofacies Correlation in Petroleum Geology," W. T. Rothwell; "Development of Upper Cretaceous Foraminiferal Faunas in Colombia, S. A," V. Petters; "Hurricane Lentil Eocene Foraminifera," Louis de A. Gimbrede; "Zonation of the Ocala Group," Harbans S. Puri; "Reclassifications of the Miocene of the Florida Panhandle," Harbans S. Puri.

Thursday, March 26. . . . American Association of Petroleum Geologists. "Geology of Western Washington," W. L. Stanton; "Oil and Gas Prospects of the Delaware Basin, Texas and New Mexico," T. F. Harriss; "Tectonics and its Relation to Oil and Gas Production in the Four Corners Area of Colorado, New Mexico, Utah, and Arizona," Paul H. Umbach; "Results of Petroleum Exploration in Naval Reserve No. 4 and Adjacent Areas, Alaska," George Gryc and Comdr. R. C. Jenson; "Geology and Petroleum Possibilities of the Gulf of Alaska Tertiary Province," Don J. Miller; "The La-Brea-Parinas Oil Field, Peru," R. B. Travis; "Oil and Gas Possibilities of Algeria and Morocco," J. Brian Eby; "Oil Fields of the Mercedes Region, Venezuela," J. M. Patterson and J. G. Wilson.

Society of Exploration Geophysicists. "Seismic Principles Applied to Wire-Rope Testing," W. A. Cartier; "Gravity Study of Meteor Crater Arizona," Norman Harding; "Interpretation of Resistivity Data over Filled Sinks," Kenneth L. Cook and Robert G. van Nostrand; "Comparison of Navigational Methods," G. A. Russell; "Signal to Noise Ratio Improvements by Filtering and Mixing," Harold R. Frank and William E. N. Doty; "The Geology of Shelder Field, Dimmit County, Texas," Thomas D. Barber; "A Major Oil Company's Safety Program," C. A. Miller; "How the National Safety Council Can Help Solve Your Safety Problems," R. G. Benson; "Geophysical Accident Facts," Bart W. Sorge; "Seismic Operations Near Power Lines and Radio Transmitters," John Imle. Also a panel discussion of geophysical safety programs.

Society of Economic Paleontologists and Mineralogists. "Faunas, Facies, and Tectonics," L. L. Sloss and W. C. Krumbein; "Subaqueous Landslides and Turbidity Currents in the Permian Basin of West Texas," J. K. Rigby; "Sedimentary Framework of the Modern Mississippi Delta," H. N. Fisk, C. R. Kolb, A. McFarlan, Jr., and L. J. Wilbert, Jr.; "Synoptic Oceanography of the Northeastern Mississippi Delta Region and its Sedimentary Implications," Charles C. Bates,, Joe Bell, and A. Wayne Magnitzky; "Nature and Origin of an Oligencene Sandstone Reservoir," R. H. Nanz; "Petrophysics of the St. Peter-Simpson Formations," E. C. Dapples and H. A. Slack; "Diagenesis of Some Pennsylvania Limestones of New Mexico," Raymond Sidwell and G. F. Warn; "Petrogenesis of Lower Pennsylvanian Sandstones of the Eastern Interior Basin," Raymond Siever; "The Direction of Sediment Transport in Basal Pennsylvanian Sandstones of Indiana and Southern Illinois," Paul Edwin Potter.

Technical Program Readied

SAN ANTONIO, Tex.—Six technical papers will be presented at the forty-first annual meeting of the Western Petroleum Refiners Association at the Plaza Hotel here March 23-25.

General-session speakers will be announced later by the association's program committee.

The technical program is as follows:

Monday, March 23: L. A. McReynolds, Phillips Petroleum Co., Bartlesville, Okla., presiding. "Effect of Fuels and Lubricants on Octane Requirement Increase," J. J. Mikita and W. E. Bettoney, E. I. du Pont de Nemours & Co., Wilmington, Del.; Progress report, W.P.R.A. - Bureau of Mines research project, Cecil Ward, U. S. Bureau of Mines, Bartlesville; "Application of Lubricating Oil Additives," W. D. Thomas, American Cyanamid Co., New York.

Tuesday, March 24: W. F. Krause, Globe Oil & Refining Co., Lemont, Ill., presiding; "Underground Storage of Liquid Petroleum Products," Douglas Ball, consultant, Washington, D. C.; "Fuel Oil Markets—A Reappraisal," A. J. McIntosh, Socony-Vacuum Oil Co., Inc., New York.

Wednesday, March 25. "Technical and Political Trends Affecting the Disposal of Refinery Wastes," R. N. Giles, Standard Oil Co. (Ind.), Chicago; "Petrochemicals Unlimited," Gustav Egloff, Universal Oil Products Co., Chicago.

MID-CONTINENT

NEARING COMPLETION is Stanolind Oil & Gas Co.'s huge research laboratory in Tulsa.

Lab Nearly Finished

Stanolind plans move into new center about April 1

TULSA. — The petroleum industry's newest research laboratory, that of Stanolind Oil & Gas Co. here, is nearing completion and is scheduled for occupancy April 1.

One of the biggest of the oil industry's research centers, the buildings will house all of Stanolind's research activities, now located elsewhere in Tulsa.

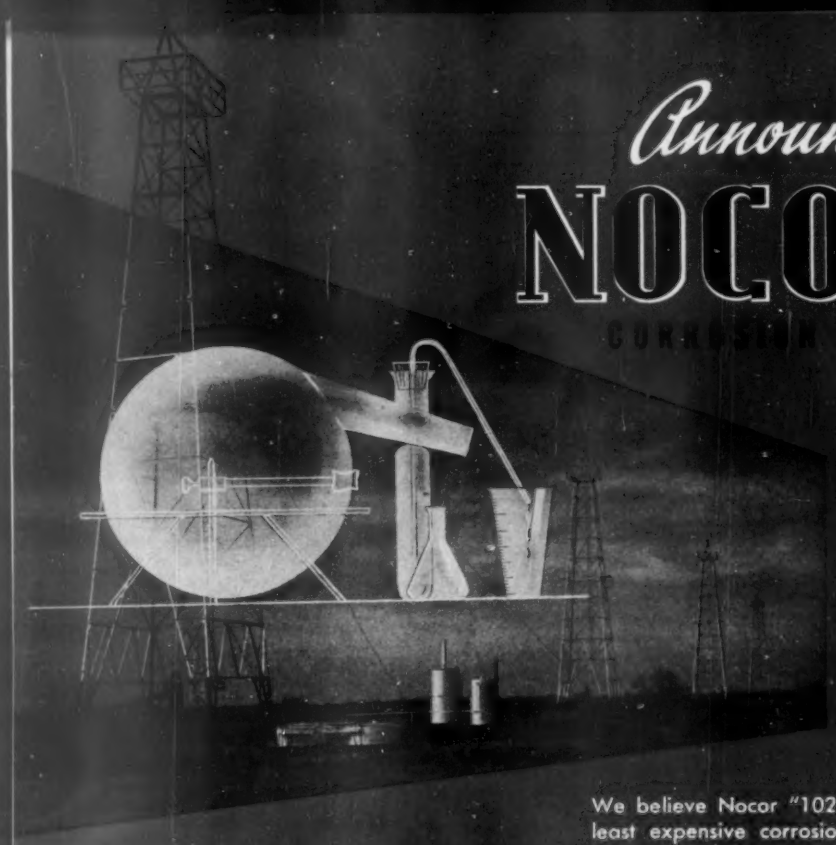
The center includes the 3-story main office and lab building, which has 117,000 sq. ft. of gross floor space, a service and maintenance building, a heavy-experiments laboratory, and a pilot-plant building.

The principal laboratory segment, in the main building, is 209 ft. long and 55 ft. wide, and accommodates more than 150 individual lab rooms.

The pilot plant, 60 by 107 ft. and varying from 2 to 4 stories in height, is designed to provide space for 50-ft. towers for studies on the manufacture of liquid fuels and chemicals by synthetic means.

In addition to the laboratories, the main building will house all technical and administrative offices, a research library, drafting and reproduction rooms, a cafeteria, conference rooms, a garage, and wiring and machine shops.

The center is located on an 80-acre tract. Construction work was first begun in October 1951.



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The manufacturers of Nocor "102" offer, without obligation, rate of corrosion test services, field service on initial application, and full consultation and advisory facilities.

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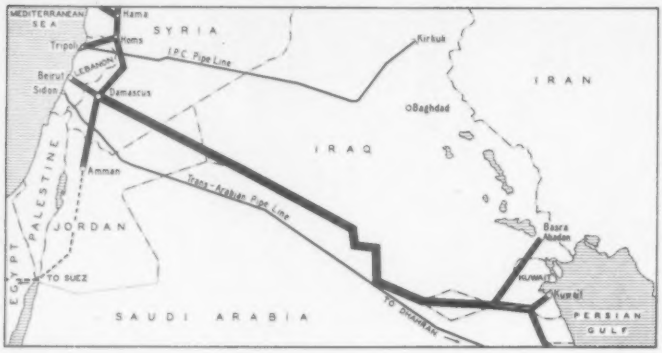

MIDDLE EAST

Pan-Arabian Highway

Proposal to link oil-producing centers on Persian Gulf with eastern Mediterranean ports attracts Arab interest

A PAN - ARABIAN International Highway which would link the oil-producing centers of the Persian Gulf with ports on the Eastern Mediterranean has been proposed by W. F. Moore, former president of Arabian American Oil Co. and now an industrial consultant in Beirut, Lebanon.

While the project as advanced by Moore laid emphasis on the stimulus it would give to broad economic development of the region, such a communication artery would be of major importance to the petroleum industry. The eastern Mediterranean is a logical point for the supply of food and other commodities to the operating companies in the Persian Gulf area, but at present the only overland communication is by a railroad which leads along the Syrian-Turkish border and to southern Iraq.

Moore set forth his ideas in a booklet which has been given wide attention in the Arab world. His proposal called for the construction of a two-lane road initially which would lead from the Mediterranean ports of Beirut and Tripoli in Lebanon and Lattakia in Syria. A branch would connect Amman in Jordan. It would extend from Damascus across Syria and along the Iraq-Saudi Arabian border to Persian Gulf terminals at Basra in Iraq, Kuwait Town in Kuwait, and Damman in Saudi Arabia.

Toll basis . . . The highway would be operated on a toll basis by an operating agency representing a Pan Arabian International Highway Authority composed of representatives of the six member states. Moore emphasized that each participating country would grant unconditionally the right of duty-free passage along the highway and handling in bond of transshipped cargo at terminals which also would be operated under the authority. The authority and its operating agency would have tax-free status.

Moore suggested that if at all possible, capital requirements be made available by the member states. If necessary, however, a loan for the project would be obtained from an international banking authority and secured by the toll collections.

Arabs must do it . . . Moore said the initiative for such a project should come from the Arabs themselves. The six Arab states involved must fully recognize that they constitute a single economic unit which can function efficiently only when linked together by a sound system of communication. "A united and sound regional economy resting upon a common interest will do more than raise the living standards of the Arab states," he said. "It will make them stronger factors, politically, culturally, and militarily."

An idea of the magnitude of the highway project is given by a comparison with the Trans-Arabian pipe line. It would be longer than Tapline's 1,068 miles. The pipe line cost well over $200,000,000 and was nearly 2 years under construction.

Note Received

Reply to Iran reportedly details U. S. oil proposal

THE United States and Britain last week replied to the Iranian counter-proposals for settlement of the oil dispute, but there was little hope that any agreement will result in the near future.

Contents of the U. S.-British reply were not disclosed officially, but it was reliably reported to detail the previous American offer to buy a large quantity of Iranian oil once the dispute is settled.

The proposals which Loy W. Henderson, U. S. ambassador in Teheran, delivered to Iranian Prime Minister Mossadegh were the latest in an exchange of messages which began late in December.

An early breakdown to this latest effort to settle the dispute was being widely predicted. The American and British governments are apparently standing on their rock-bottom condition that the compensation issue must be fairly adjudicated by an international tribunal.

Internal trouble . . . While Dr. Mossadegh and his advisers were examining the text of the reply, new internal political trouble arose in Iran. The attacks on the prime minister reached such an extent that he threatened to resign unless the "obstructions" to his policies were removed.

Newspapers and some of Iran's political advisers are now urging the government to work toward creating an economy that can exist indefinitely without oil revenue. This reinforced the belief that new U. S.-British proposals will be rejected, as have a half dozen other settlement offers over the last two years.

FAR EAST

Japan Sets Oil Investigation

Eleven oil companies, including Shell and Standard-Vacuum Oil Co., are facing an investigation in Japan by the government's Fair Trade Commission for an alleged price-fixing agreement.

A hearing is scheduled for March 25 in Tokyo on the complaint, according to an announcement by the Japanese commission. The complaint was made by the Japanese Government's National Safety Board, which charged that the companies agreed on prices before submitting tenders for petroleum

Jot it down

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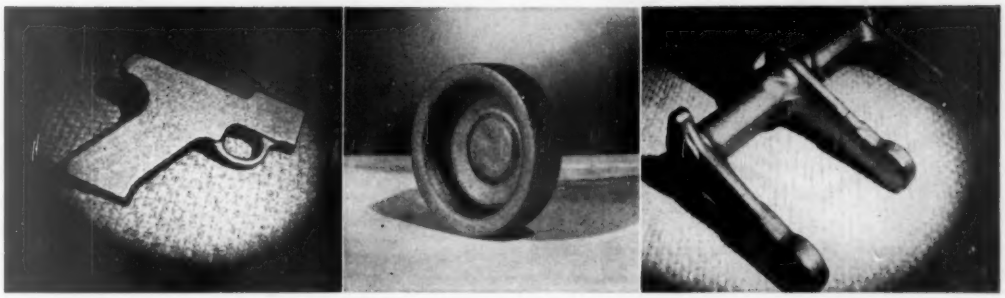

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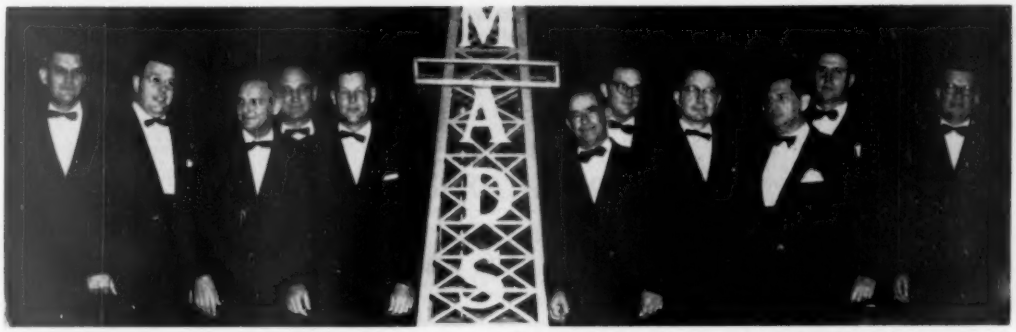


New Officers of the Houston Nomads

Newly elected officers of the Houston chapter of Nomads, shown here after their installation recently, are, left to right, H. J. Wood, Lebanon Steel Foundry, regent; H. Ben Young, Mission Manufacturing Co., sergeant-at-arms; Joe A. Lyne, Parkersburg Rig & Reel Co., deputy sergeant-at-arms; W. O. Hendrick, McEvoy Co., assistant secretary; Ed M. Fontaine, National Tank Co., president; E. T. Adams, Kerotest Manufacturing Co., assistant treasurer; W. L. Childs, Jr., Reed Roller Bit Co., treasurer; Madden T. Works, Cameron Iron Works, secretary; Ray Doan, Coffing Hoist Co., vice president; R. K. Franklin, Rolo Manufacturing Co., regent; and Harry E. Estes, A-1 Bit & Tool Co., executive secretary.

products to the board. The National Safety Board is acting as a kind of Defense Ministry.

The complaint is the first to be brought against foreign companies under the antitrust laws which were introduced during the allied occupation of the country. The chief of the Fair Trade Commission's general-affairs section, said that, if the charges are proved by the commission, the companies probably would be required to junk the alleged agreement and give guarantees that such practices will be discontinued in the future.

Companies engaging in the Japanese trade include Shell and three American firms, Standard-Vacuum, California Texas Oil Co., Ltd., and Tide Water Associated Oil Co. These foreign firms are in partnership with different Japanese companies which refine and market in the country.

LATIN AMERICA

Argentine Protest Rejected

The Bolivian Government has rejected an official Argentine protest against an oil-development contract which Bolivia reportedly has signed with Glenn McCarthy, Houston independent operator.

Reports from La Paz are that the Bolivian Government plans to issue a decree in the near future which will make its deal with McCarthy effective. Under it, McCarthy will receive oil rights over a large area in southwestern Bolivia. Last summer McCarthy obtained a sulfur-mining concession in Potosi Department on the Chilean border.

The protest which the Argentine Government made against the McCarthy oil contract was based on a 1941 treaty between the two countries under which Argentina agreed to build a railroad to Salina Cruz with payment by Bolivia from oil to be developed in the area. The Argentine ambassador in La Paz asked that either Argentine or purely Bolivian interests develop the area.

The protest was turned down by Bolivia. However, a 6-mile-wide zone along the border has been excluded from the oil concession in order to avoid disputes with Argentina.

Nogales Drilling Slated

E. W. Pauley, independent operator holding a percentage-of-production contract from Petroleos Mexicanos, said recently in Mexico City that his organization expects to begin drilling in the near future on the Nogales structure about 60 miles south of the Texas border between Reynosa and Cuidad Victoria in Tamaulipas.

This structure has been assigned by Pemex to the Pauley interests for exploration. Pauley also said that the two rigs now working in Trevino field will be increased by one rig in addition to the equipment to be used in the Nogales area. Citadel Drilling Co., San Antonio, and Joe Dixon, Midland, are drilling under contract for Pauley in Trevino field.

The eight producing wells in Trevino field now have an output of about 1,300 bbl. daily but can produce more than 2,000 bbl. daily when storage and transportation facilities are completed, Pauley said. In addition, the California operator said that gas reserves estimated at between 1 and 5 trillion cubic feet have been developed. Recently the most easterly well in Trevino found a new producing sand between the Rosario at about 5,900 ft. and the Ensenada at about 6,800 ft.

EUROPE

New Cat Near Completion

Erection of the Houdriflow catalytic cracking unit at the new Lingen-Holthausen refinery in West Germany now is nearing completion.

Work on this part of the plant's process equipment started in July 1950. The Lingen installation is the first modern Houdriflow moving-bed unit to be built in Europe. A fixed-bed unit of this type has been in operation for several years at Berre, France, where Shell has a refinery.

The entire Lingen refinery is expected to go on stream this summer. It will process crude produced from the Emsland region in West Germany near the Dutch border. Full capacity will be about 10,000 bbl. daily, and the partial operation in 1953 is expected to average out to about 4,000 bbl. daily. The refinery is being built by German operators through Gewerkschaft Erdoelraffinerie Emsland.

Romanian Oil Men Convicted

The recent "trial" of 24 oil officials in Communist Romania on charges of sabotage and espionage resulted in prison sentences ranging from 3 years to life at hard labor for the various defendants.

A military court at Ploesti found all of the group guilty of acts interfering with oil production consigned to the Soviet Union. Six of the group, including the former Romanian finance

Ground-Breaking Ceremonies

Ground was broken officially recently to mark the beginning of construction on the new 60,000-bbl.-daily refinery of Anglo-Iranian Oil Co., Ltd., in western Australia. The site for the new plant is at Kwinana near Fremantle. Left to right, are: A. R. G. Hawke, western Australian Government opposition leader; C. H. E. Reebeck, resident engineer of the refinery; Sir Ross McLarty, western Australian premier; and A. E. Mason, general manager of the Kwinana project (an Anglo-Iranian photo).

minister, Alexander Alexandrini, were given life in prison or at hard labor in camps, while the other 18 received sentences varying from 3 to 25 years at hard labor. Romania has no death penalty.

The defendants were all Romanian nationals, mostly engineers and technicians who were required to continue working in the industry after the Communists took over the country. The trial was regarded as a propaganda effort to cover up the serious difficulties in the Romanian industry *(The Oil and Gas Journal, February 16, page 109)*.

Discovery Followed Up

Further drilling is under way by the German company, Gewerkschaft Elwerath, in an effort to determine definitely the significance of the new oil discovery at Stockstadt in the northern part of the Upper Rhine Valley in West Germany.

The operator is drilling Stockstadt 2 and has made a location for a third well about 2,600 ft. south of Stockstadt 1. The discovery well was brought in late last year. On production tests, it flowed at a rate of about 150 bbl. daily of light crude from the Pechelbronn formations of the lower Oligocene at a depth from about 5,250-5,300 ft.

The discovery has been termed the best oil find in West Germany in 1952 from the standpoint of future development. It was the first time the Pechelbronn formation, which has for years yielded small production across the border in Alsace, France, has been encountered so far north in the Upper Rhine Valley. It also was the first instance of commercial production from a structure in the center of the Rhine graben.

The discovery of the Stockstadt pay and a gas find at nearby Pfungstadt have directed new attention to the prospects of this part of West Germany.

International Briefs

Mexican American Independent Co. (CIMA), which holds a percentage-of-production contract from Petroleos Mexicanos, plans to drill two wells in southern Mexico in which American Independent Oil Co., one of CIMA's major stockholders, will not participate, according to reports from Mexico City. The operations will be handled by the two remaining CIMA partners, the Belgian company, Petrofina, and E. W. Pauley, California operator. The wells are Rabon Grande 171, to be located on the east side of the field, and a new exploratory test on the Minatitlan structure.

The Egyptian Government has placed another tanker on its blacklist for transporting motor fuel to Israel. The tanker is the Stony Point, owned by United States Petroleum Carriers, Inc. Egypt, still technically at war with Israel, has blacklisted about 60 ships, mostly tankers, which are then denied facilities in Egyptian ports but can still use the Suez Canal.

A price of $2.29 a barrel for Middle East crude at the eastern Mediterranean has been officially announced in a new posting by Socony-Vacuum Overseas Supply Co. The new posting follows a price drop of 12 cents which was inaugurated by Esso Export Corp. February 5 *(The Oil and Gas Journal, February 16, page 106)*. Socony-Vacuum, the only Middle East supplier publicly posting crude prices, announced the new $2.29 price for 36-36.9°-gravity Iraq crude delivered at Banias, Syria, or Tripoli, Lebanon, and Saudi Arabian crude delivered at Sidon, Lebanon, also effective February 5.

Esso Petroleum Co. announced recently in London that it has concluded an agreement with the Danish Esso company, also a Standard Oil Co. (N. J.) affiliate, to supply between 600,000 and 700,000 tons (approximately 4,200,000 to 4,900,000 bbl.) of products in 1953 from its Fawley refinery near Southampton in England. The contract will save Denmark dollars, increase Britain's export earnings. The products involved have an aggregate value of about £7,000,000, or nearly $20,000,000.

A new T.C.C. catalytic cracking unit is scheduled to go on stream in the near future at the refinery of Deutsche Vacuum Oel, A.G., in Bremen-Oslebshausen, West Germany. The unit will have an annual throughput capacity of about 9,000 bbl. daily. With the new catalytic cracker in operation, the total capacity of the refinery will be stepped up to about 14,000 bbl. daily.

Guests of the Houston Nomads

Foreign visitors attending the February meeting of the Houston Chapter of Nomads included, left to right, John W. Gunn and D. G. Sawyer, Texas Petroleum Co., Bogota, Colombia; Earl Overstreet and Glenn Byers, Shell Oil Co., Houston; E. E. McGar, Shell Caribbean Petroleum Co., Maracaibo, Venezuela; and Staley Kessinger, Creole Petroleum Corp., Maracaibo.

Promoted by PAD

C. E. Davis, former Shell veep, is agency official

C. E. DAVIS has been promoted to associate deputy administrator of the Petroleum Administration for Defense.

Since last April he has been assistant deputy administrator in charge of domestic petroleum operations. In his new post Davis will assist Deputy Petroleum Administrator J. Ed Warren in exercising responsibility for the overall petroleum and gas programs of the PAD.

Davis got his start in the oil business as a shipping clerk in Shell Oil Co.'s Cushing, Okla., refinery. He broadened his experience in the Wood River and Houston refineries and was promoted to the head office in St. Louis in 1932.

He later became assistant to the vice president in charge of manufacturing, general manager of the manufacturing department at New York, and vice president in charge of manufacturing. He joined the PAD in 1951 as deputy director of the agency's refining division and became division director the following month.

During World War II he was a member of various industry committees having to do with the manufacture of critically needed products. He also has been active in the American Petroleum Institute's Division of Refining and committees of the National Petroleum Council and the Military Petroleum Advisory Board.

Koli K. Amini, reservoir engineer for Sunray Oil Corp., has been transferred from Oklahoma City to San Antonio, Tex.

Harold E. Wright has been appointed to the board of directors of Trans Empire Oils, Ltd., Calgary, Alta., independent firm, succeeding **J. M. Dillon.** Wright formerly was a director of Redwater Leaseholds, Ltd.

Dr. Nicolaas J. Taverne, a Dutch mining engineer, has been assigned to spend a year in Bolivia as a United Nations technical assistance expert. He will work with the Bolivian National Petroleum Board in a study of operations relating to oil production.

D. M. Forbes, Dallas, a director of Renwar Oil Corp. and Bond Oil Corp., has been elected president of Pan American Sulphur Co. succeeding **J. R. Parten** who recently resigned. The company was organized in 1947 and holds sulfur concessions from the Mexican Government on the Isthmus of Tehuantepec.

Miss Hazel A. Peterson has been appointed a geologist in the administrative department of Seaboard Oil Co. of Delaware at Dallas. For the past 8 years she has been a subsurface geologist for Sun Oil Co. at Corpus Christi and Dallas.

G. H. Herridge, who has been head of the concessions and administrative division of the London headquarters of Iraq Petroleum Co., Ltd., for the past year, has been appointed executive director to I.P.C. and associated companies. Herridge has been with I.P.C. organization since 1926 when he joined the then Turkish Petroleum Co. In 1940 he became assistant to the general manager in the Middle East and general manager in 1947. He returned to London in 1951.

F. E. Wellings has been appointed chief geologist for Iraq Petroleum Co., Ltd., and its associated companies, and **N. E. Baker** has been made geological consultant to the group. Wellings became field and subsurface geologist with Shell in Mexico in 1921 and in 1929 was appointed senior geologist to I.P.C. in Kirkuk, Iraq. He became deputy chief geologist in Tripoli in 1937, returning to London in 1950. Baker, who was educated at the University of Iowa and at Birmingham University in England, was resident geologist in Trinidad from 1919 to 1923 and associated with the Standard Oil Co. (N. J.) organization before he became chief geologist for the I.P.C. Group in 1935.

S. B. Deal, area drilling superintendent for Shell Oil Co., has been transferred to the Calgary, Alta., area. He was given his present title in 1948 and has worked in Western Kansas, Oklahoma, North Texas, and Illinois.

William M. Capps, engineer for Amerada Petroleum Corp., has been transferred from Big Lake, Tex., to Tatum, N. M.

Hollis W. Deats, district engineer at Odessa, Tex., for Texas Pacific Coal & Oil Co., has been promoted to division engineer at Breckenridge, Tex.

ROY L. LAY

Roy L. Lay, Houston, manager of the geophysical division of The Texas Co. in Houston, has been elected president of the Society of Exploration Geophysicists. Other officers, all of whom will assume office at the conclusion of the society's annual meeting in Houston March 23-27, are: **Dr. Karl Dyk,** chief geophysicist for Stanolind Oil & Gas Co. in Tulsa, vice president; **Bart W. Sorge,** vice president of United Geophysical Co. at San Gabriel, Calif., secretary-treasurer; and **Milton B. Dobrin,** senior research technologist at Magnolia Petroleum Co.'s field-research laboratories in Dallas, editor. The society's annual meeting will be in conjunction with that of the American Association of Petroleum Geologists and the Society of Economic Paleontologists and Mineralogists.

E. E. Ebner of Emlenton, Pa., general superintendent of refineries for Quaker State Oil Refining Corp., has been appointed chairman of the technical advisory committee of the Pennsylvania Grade Crude Oil Association. He succeeds the late MacLean Houston, Warren, Pa. **Dr. A. W. Lewis** of Tide Water Associated Oil Co.'s research and development department at Bayonne, N. J., has been acting chairman. Ebner has appointed the following chairmen of subcommittees: Dr.

PERSONALS

Lewis, Armour Research Foundation of Illinois Institute of Technology, steering subcommittee; **F. I. L. Lawrence,** Kendall Refining Co., Bradford, steering committee of the Petroleum Refining Laboratory, Pennsylvania State College; and **C. W. Cable** of United Refining Co., Warren, additive subcommittee.

R. M. Leibrock has been transferred from the division office of Stanolind Oil & Gas Co. in Fort Worth to Midland, Tex., as district engineer. He succeeds **J. C. McCarthy,** who recently was promoted to division engineer at Casper, Wyo. **R. W. Hines** has been transferred from Fort Worth to Abilene as district engineer.

James W. Roche, who has been North Texas division manager for Shell Oil Co. since 1948, has been named to succeed **J. Earle Gray** as Colorado division production manager.

Murray J Wells, division geologist for Cities Service Oil Co. at Casper, has been named Northwest division manager of exploration there. The division includes the northern Rocky Mountains, Williston basin, and adjacent areas. Wells also will continue to act as division geologist. Establishment of the northwestern division office is another step in a decentralization program undertaken because of increasing exploration activities.

J. R. Vandever, formerly exploitation department general superintendent for Sunray Oil Corp. at Tulsa, has been named manager of joint operations. He will be in charge of partnership operations, lessor relations, and contract obligations of the department. Vandever joined Sunray in 1930 and served as division superintendent for the North and West Texas district before being transferred to the Tulsa general offices in 1948. **John H. Douma** and **C. J. Kerwin,** formerly assistant general superintendents in the exploitation department, have been named southern division superintendent and northern division superintendent respectively. **M. S. Patton, Jr.,** who has been with Sunray since 1948, has been appointed development adviser of the department, and **J. F. Adkisson, Jr.,** has been named technical adviser.

James A. Wilson, manager of the Houston division of United Gas Corp., has been appointed to the newly created

J. A. WILSON

C. L. MORGAN

position of superintendent of Texas distribution operations. **C. L. Morgan,** Houston division superintendent, will succeed Wilson in his former post.

W. E. Bonner has been transferred from Benavides to Longview, Tex., as production foreman for American Republics Corp.

Richard E. Grove, reservoir engineer for Ohio Oil Co. at Casper, has been transferred to Cody, Wyo., as field reservoir engineer.

Thomas W. Keating, mechanical group supervisor in the research department of Stanolind Oil & Gas Co. at Tulsa, has been transferred to Houston as drilling engineer.

Harold L. Crisman has been appointed general superintendent of production for O. F. Warren, Tulsa independent producer. He recently resigned as drilling and production superintendent for W. C. McBride, Inc.

Harold F. Morrow of Gardiner, Low & Morrow, has been elected president of the Saskatchewan Geological Society. Other officers include: **Claude E. Leach,** Tide Water Associated Oil Co., vice president; **H. Ray Ellard,** Imperial Oil, Ltd., secretary-treasurer; **J. W. Porter,** Canadian Superior Oil of California, Ltd., business manager; and **Gordon B. Darling,** Imperial Oil, Ltd., program chairman. These officers, along with **Robert A. Bishop,** Sohio Petroleum Co., past president, comprise the executive committee.

H. J. Gruy, petroleum consultant, has been elected president of the Petroleum Engineers' Club of Fort Worth. Other officers include: **George Brown,** The Texas Co., executive vice president; **R. M. Powers,** Stanolind Oil & Gas Co., first vice president and chairman of the program committee; **J. L. Waltrip,** Mid-Continent Supply Co., second vice president and chairman of the entertainment committee; and **Harry Gill,** General Electric Co., secretary-treasurer.

Charles J. Deegan has opened offices in Dallas for petroleum consulting and appraisal of oil properties. He formerly was with the Fort Worth consulting firm of Cummins, Berger & Pishny and later opened his own office in that city. From 1944 to 1948 he was an associate editor for The Oil and Gas Journal.

Lawrence H. Gall, Bethesda, Md., has been named director of research for the Independent Natural Gas Association of America.

Eugene L. Earl has been appointed vice president and manager of Louisiana exploration for Monterey Exploration Co., San Antonio, Tex. His headquarters will be in New Orleans.

T. D. Barber has been appointed assistant division geologist at Houston for Stanolind Oil & Gas Co. **Caldwell Starkey** has been named district geologist at Corpus Christi.

William D. Carson, formerly a senior reservoir engineer for Continental Oil Co. at Ponca City, Okla., has been appointed a petroleum engineer in the evaluation section of Skelly Oil Co. at Tulsa.

R. T. Chapman, formerly a consulting geologist in Shreveport, has joined **H. L. Brown,** San Antonio independent. He has opened offices in Beaumont, Tex., where he will watch Brown's interests in the upper Gulf Coast, Louisiana, and South Arkansas.

CHARLES LEET

Charles Leet, assistant general manager of Esso Standard Oil Co.'s Baton Rouge refinery, has been named to the newly created post of manager of the company's Bayonne, N. J., refinery. **William F. Wadt** is being promoted from assistant to general superintendent at Bayonne. He succeeds **George A. Esty,** who will remain on special assignment in a consulting capacity until he retires this fall.

PERSONALS

Howard M. Bramley, district production engineer for Lone Star Gas Co., has been transferred from Coleman, Tex., to Ballinger, Tex.

F. A. RUNION

Felix A. Runion, a partner on the firm of Smiser & Runion, petroleum geologists and engineers at Houston, has joined the staff of Rice Institute to manage the school's oil interests and to assist in obtaining new oil investments. Runion formerly was a petroleum consultant in the firm of Boyce, Smiser & Runion, which later became Smiser & Runion. Prior to that he was head of the evaluation section of Humble Oil & Refining Co.

Harry B. Brown has been elected vice president and a member of the board of directors of Macmillan Petroleum Corp. He formerly was an officer of Lester & Co. and was connected with other investment firms.

R. L. Allardyce has resigned as division geologist for **Ralph Lowe** at Casper to join **Charles B. Chittim** in a new firm which will specialize in geological consulting and buying and selling leases. Offices will be maintained in both Denver and Casper.

LeRoy F. Stewart has been appointed district manager of the new district exploration office at Abilene, Tex., of Warren-Bradshaw Exploration Co. Activities of the company in West Central and West Texas will he handled from the office.

Tom Newell, Cardinal Chemical, Inc., Odessa, Tex., has been elected chairman of the Permian basin chapter of the National Association of Corrosion Engineers. He succeeds **John Shelton,** National Tank Co., Midland, Tex. Other officers are: **E. O. Kemper,** Permian Enterprises, Inc., Odessa, first vice chairman; **W. A. Hopwood,** Tnemec Co., Inc., Odessa, second vice chairman; and **John Knox,** Western Co., Midland, secretary-treasurer.

James A. Shelton, intermediate petroleum engineer for Sinclair Oil & Gas Co., has been transferred from Midland to Wink, Tex. Other company changes involve: **C. C. Confer,** junior petroleum engineer, transferred from Sand Draw, Wyo., to Big Spring, Tex.; **Paul Davis, Jr.,** junior petroleum engineer, transferred from Odessa to Arp, Tex.; **Lloyd W. Biddick,** junior petroleum engineer, transferred from Arp to Big Spring, Tex.; and **Byron L. Plumley,** intermediate petroleum engineer transferred from Ardmore, Okla., to Bairoil, Wyo.

Harry W. Grindal, New York City investment banker, has been elected a director of Bailey-Shelburne Oil & Gas Co., Calgary, Alta. He fills the post vacated by the recent death of E. O. Hall.

Frank Lemmond has been appointed drilling superintendent for Darrell W. Smith, Midland operator. He formerly was with Zephyr Drilling Co. in the Permian basin.

C. C. Beebe and **J. D. Turner** of Evansville, Ind., have organized the C. C. Beebe Drilling Co.

L. A. Martin has been elected vice president and chief geologist for United Geophysical Co., Pasadena, Calif. He has been with the firm since 1946 and has served as manager in Venezuela and manager of foreign operations.

George S. Buchanan has resigned as vice president in charge of land and exploration for Sohio Petroleum Co., Houston. He has joined Husky Oil Co., Cody, Wyo., as a director and vice president in charge of exploration. In addition to directing land and exploration activities for Sohio in the United States and Canada, Buchanan also served as operator's representative in Canada for a group of six associated companies. Prior to joining Sohio in 1945 he was president of Adams Louisiana Co. and Yegua Corp. Adams Louisiana Co. was purchased by Sohio.

J. K. Henderson has been promoted to chief field engineer for Dowell Incorporated, at Tulsa. He formerly was district engineer at Wichita Falls, Tex. In his new assignment he and his staff will act as liaison between various laboratories, technical development groups, and engineers in the field. Development engineers working with Henderson are **Warren L. Sallee, Fred E. Rugg, George L. Gore, M. W. Russell,** and **B. P. Robinson.**

P. J. Kotulek has been appointed superintendent for W. A. Schuller, Evansville, Ind., operator. He succeeds his brother, J. R. Kotulek, who died recently.

Samuel T. Brown has been elected president and a director of Trans Continental Oil Corp., Dallas. He succeeds **Clarence J. Simpson.**

Robert M. Oliver has been appointed technical director of Radio Geophysical Co., San Antonio, Tex. He will be located at Austin, Tex. He formerly was a seismologist for Magnolia Petroleum Co.

William G. Maguire, chairman of the board of Panhandle Eastern Pipe Line Co., has been elected president succeeding **Edward Buddrus,** who has resigned. **Hy Byrd,** president of Trunkline Gas Co., has been elected vice president.

DEATHS

Charles Ernest Priestley, 64, retired southern district superintendent for Standard Oil Co. of California, died February 20 in Whittier, Calif.

Clayton E. Dial, 56, formerly an oil drilling contractor in the Davenport and Seminole fields, died February 25 in Bristow, Okla. Until recently he was president of Security Finance Co., a company he helped organize about 20 years ago.

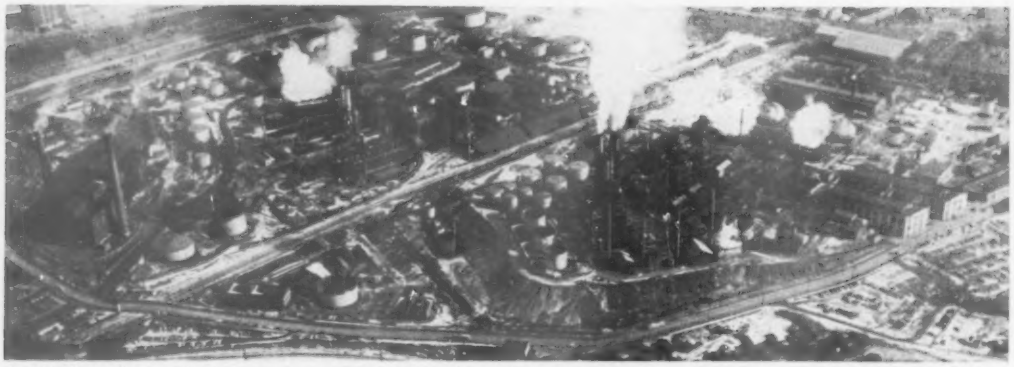
Joseph Loriaux, 87, independent, died in a Bartlesville, Okla., hospital February 20. He was a native of Belgium and moved to Bartlesville in 1914.

Mrs. Betty Norwood, 73, an agent for Gulf Oil Corp. the past 35 years, died February 18 in a Marlin, Tex., hospital. She succeeded her husband, R. Lee Norwood, as agent upon his death in 1918.

J. D. Nantz, 64, independent operator, died February 18 in a Tyler, Tex., hospital.

La Forde Latourette, 66, former superintendent for Galena Signal Oil Co. in Elizabeth, N. J., died February 21 of a heart attack at Roselle, N. J.

A. M. Myers, 71, independent oil operator, died February 18 at his home in Casey, Ill., after a 2-years' illness.



CLEVELAND NO. 1 REFINERY of the Standard Oil Co. (Ohio). The T.C.C. unit is in near foreground. The Cuyahoga River and dock facilities are just out of the picture at the bottom center.

EXAMPLE OF EFFICIENCY

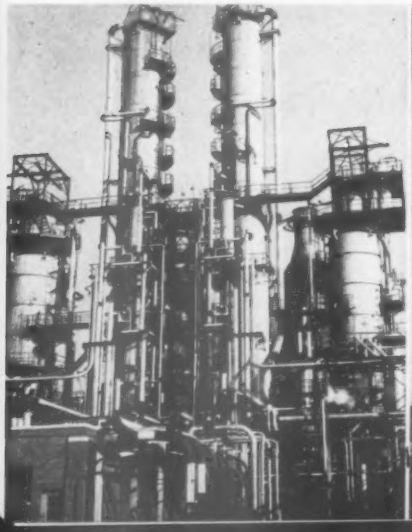
Extreme Flexibility Features Operation Of Sohio's Plants

Feed stocks, intermediate streams, and products are moved from refinery to refinery at will via pipe line, tanker, barge, and rail.

by Gerald L. Farrar
Engineering Editor

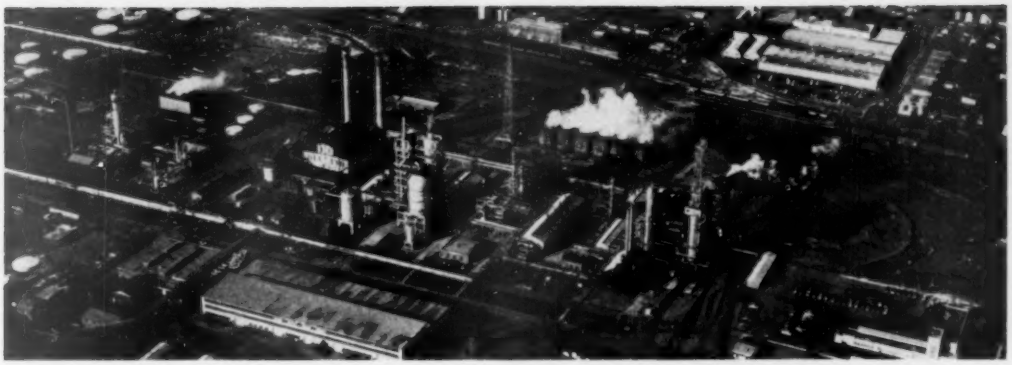
PRODUCT PIPE-LINE SYSTEM of Sohio is shown on this Ohio map. Facilities are available to move feed stocks and products in either direction at any point along the line.

1 CRUDE DISTILLATION at Cleveland No. 1 refinery is carried out in two identical two-stage crude distillation units.



2 CAT CRACKER at Cleveland No. 1 is of the air-lift T.C.C. variety.

3 GAS PLANT at the Latonia refinery is used to process gaseous materials from the various process units. Butane, L.P.G., and dry gas are products.



SOHIO'S LIMA REFINERY has been completely modernized in the last few years. Processing facilities include catalytic polymerization, cracking, and reforming; delayed coking; and solvent lube plant.

REFINING operations at the five plants of Standard Oil Co. (Ohio) are featured by extreme flexibility. All five, the Toledo; Lima (Ohio); Latonia (Covington, Ky., near Cincinnati); Cleveland No. 1, and Cleveland No. 2 refineries, are interconnected by pipe line. It is theoretically possible to move feed stocks, intermediates, or products through these lines from one location to any other.

In addition, the Cleveland refineries and the Toledo refinery are directly connected by water through the Cuyahoga River, Lake Erie, and the Maumee River. All the refineries are interconnected by rail transportation.

Refinery locations, products pipe lines, and water-transportation routes are shown on the accompanying map.

Diversified facilities . . . A plant-by-plant summary of the company's processing facilities and unit capacities is shown in Table 1. Due to differences in the various refining schemes and to the varying demands encountered from time to time in routine operation, it is advantageous to be able to transfer feed stocks, intermediates, and products from plant to plant as needed.

Catalytic cracking units are located at the Cleveland No. 1 and Lima refineries. Since these units are comparatively large, there is an intraplant scarcity of prime virgin gas-oil feed to these units. As a result, gas oil is moved in from Toledo and Latonia where there are no cat cracking facilities.

Day-to-day operations call for the movement by pipe line of gas oil from Latonia to Lima. Gas oil is also moved by pipe line from Toledo to Cleveland. When the lines are being used for other purposes, gas oil can be moved from Toledo to Cleveland by barge.

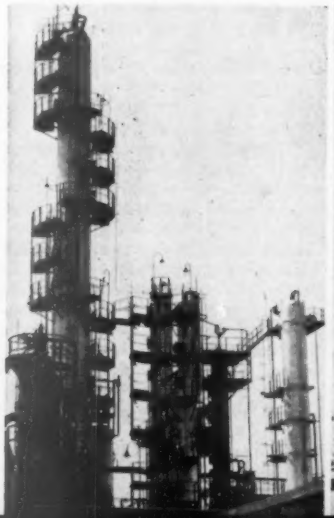
The company's only alkylation unit is located at Toledo. Since substantial amounts of isobutane and butane-butylene streams are produced in the cat cracking operations at Cleveland and Lima, the bulk of the feed to the Toledo alkylation is shipped by pipe line from these plants. In all, some 4,000 bbl. per calendar day of C_4's are currently being delivered to Toledo.

In addition to these routine shipments of gas oil and C_4's, various feed stocks and intermediate products are moved more or less regularly via pipe line from Latonia to Lima, and from Latonia to Lima to Cleveland. Such stocks are also transported from Toledo to Lima and Cleveland.

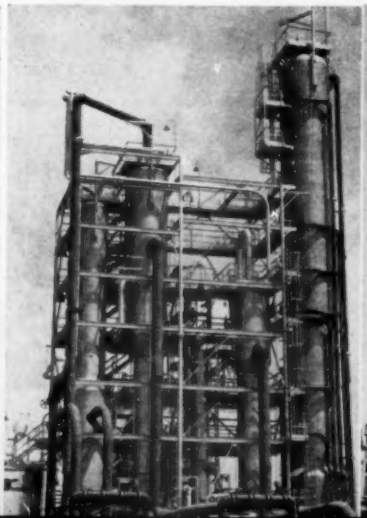
Lube stocks for the Cleveland No. 2 refinery, produced in the Cleveland No. 1 refinery, are delivered by pipe line.

With such flexibility of operation, it might be supposed that Standard of Ohio would have no problem in distributing the various stocks to the refineries as needed. Such, however, is not the case. As H. G. Cannon, Jr.,

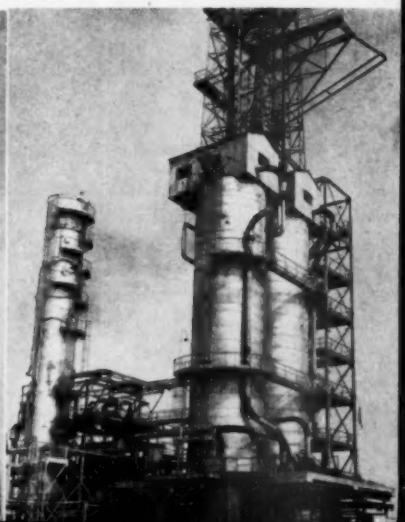
4 **SULFURIC-ACID ALKYLATION unit is installed at the Toledo refinery. Capacity is 2,000 bbl. per day of light alkylate.**



5 **FURFURAL EXTRACTION unit is used in production of high-grade lubricating oils at the Lima refinery.**



6 **DELAYED COKING facilities are installed at Toledo and Lima. Here is the Lima 10,000-bbl. per day unit.**



of the Cleveland manufacturing department staff, puts it, "We often wish our pipe lines had partitions down the middle. In that case, we could move shipments in both directions at the same time."

Product distribution . . . Movement of finished products is accomplished by Sohio with the same versatility as that exhibited in the movement of refinery stocks.

Due to the congested conditions in both Toledo and Cleveland, bulk terminals have been located in suburban areas, at some distance from the refineries. In both instances, light products are delivered by pipe line. Products are also moved by pipe line to bulk stations in Kent, Hartville, Akron, Canton, Tiffin, Fostoria, Findlay, Toledo, Springfield, Dayton, Columbus, and Cincinnati; and to terminals in Cleveland, Mogadore, Fostoria, Lima, and Bromley.

Products are moved by barge up the Ohio River to terminals at Portsmouth, Marietta, and Tiltonville. A tanker fleet moves products to various ports on the Great Lakes.

Cleveland refineries . . . Crude for the No. 1 refinery is a mixture which includes Illinois, Mississippi, Arkansas, and Oklahoma crudes, with Illinois predominating. The crude is delivered through the Mid-Valley and Buckeye pipe lines.

Processing units consist of two identical two-stage crude distillation units, two identical Thermofor catalytic cracking units, four thermal cracking units, a catalytic polymerization plant for production of polymer gasoline, a naphtha rerun unit, and asphalt-production facilities.

The twin atmospheric and vacuum distillation units (see accompanying picture) will handle 22,500 bbl. per day each. These units, which were completed in 1952, replaced a number of continuous shell stills and two vacuum pipe stills previously used for crude distillation. These two units handle the total crude run to the refinery.

The T.C.C. units employ the airlift technique. The units are now handling some 16,000 bbl. of fresh feed daily.

The naphtha rerun column is employed for making a large variety of special naphtha cuts.

Selected lube stocks are prepared in the No. 1 refinery and sent to the No. 2 refinery which is engaged solely in lube-oil production.

Lima refinery . . . The Lima refinery receives its crude from the Buckeye and Mid-Valley pipe lines. Illinois crude is segregated from remaining crude, which is a mixture of Mississippi, Arkansas, and East Texas crudes.

The major operating units at Lima are a crude pipe still, crude coker, fluid catalytic cracking unit, thermal reforming unit, vacuum distillation unit, propane deasphalting unit, solvent lube plant, and catalytic polymerization plant.

Illinois crude is charged to the pipe still at the rate of approximately 20,000 bbl. per calendar day. Reduced crude, amounting to approximately 30 per cent of the crude charge, is fed to the vacuum distillation unit in which raw lube stocks are prepared.

Bottoms from this unit are charged to the propane deasphalting unit where additional lube stocks are produced. The asphalt extract is charged to the crude coker.

Approximately 22,500 bbl. per calendar day of the mixed crude is charged to the crude coker unit. This is a combination unit, involving crude distillation and residual coking. Products are light distillate, heavy distillate, gas oil, and coke.

The solvent lube-oil plant consists of a furfural-extraction unit, a methyl-ethyl-ketone dewaxing unit, and a clay contacting unit. Finished lube stocks from these units are blended into finished motor oils.

Most of the wax stocks for the company's total wax production are processed at Lima. Some 420 bbl. per calendar day of waxes from paraffin distillate, intermediate distillate, vacuum cylinder stock, and deasphalted cylinder stock are produced in the Lima lube plant.

Toledo refinery . . . Feed to the Toledo refinery is Illinois crude. This crude is delivered to the refinery through the Buckeye pipe line.

Processing units consists of a combination crude distillation and thermal cracking unit, delayed coker, a catalytic polymerization plant, a sulfuric acid alkylation unit, and a thermal reforming unit.

Crude is fed to the crude flash tower, from which the usual distillate streams are removed. Reduced crude from this tower is fed to the delayed coker. Gas oil from the coker is combined with gas oil and paraffin distillate and sent to the combination tower. Naphtha and gas oil from this tower are thermally reformed and thermally cracked, respectively.

Products from the thermal operations are combined with the straight-run fractions and further processed to finished products in conventional manner.

Butane streams from Lima and Cleveland are joined with the butane produced in Toledo and fed to the alkylation unit. Present capacity of the alkylation plant is some 2,000 bbl. daily of stabilized light alkylate.

A larger alkylation plant is now under construction. These facilities will be completed in the summer of 1953, and will add 3,000 bbl. per day of light alkylate capacity. The new unit is also of the sulfuric acid type, with the modified Kellogg reactor.

Latonia refinery . . . East Texas or Mississippi crude is delivered to the Latonia refinery through the Mid-Valley pipe line.

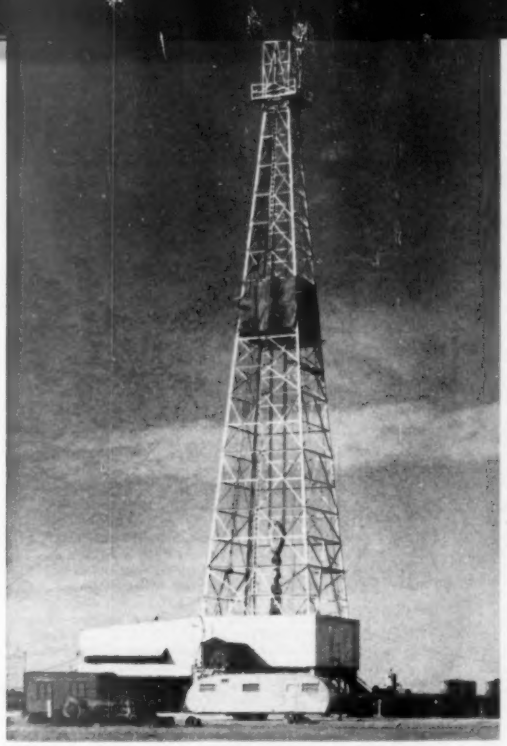
Processing units at Latonia include a battery of shell stills, a vacuum pipe still, asphalt works, two thermal cracking units, a catalytic polymerization plant, treating units, and gas plant.

Crude is fed to the continuous shell still battery, from which is removed the various conventional distillate products and a bottoms fraction. This fraction is fed to the vacuum pipe still. Side and overhead streams from this vacuum unit are fed to the thermal cracking coils, while the bottoms stream is used in making asphalt.

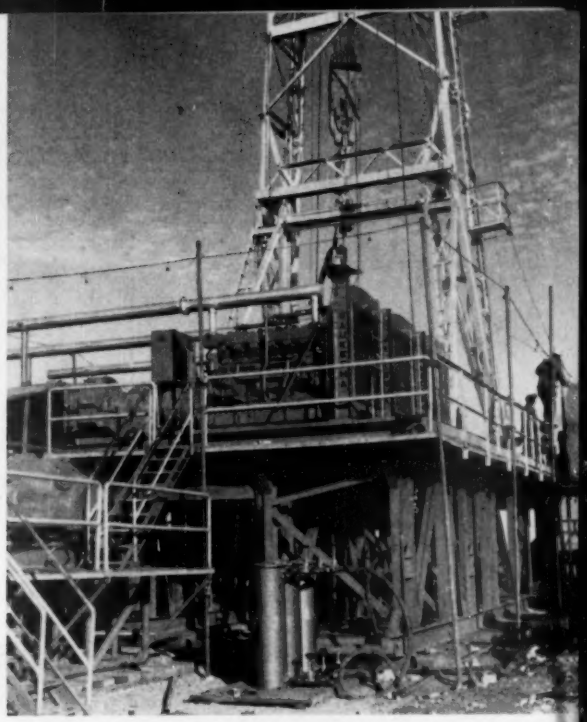
TABLE 1—PROCESSING FACILITIES, STANDARD OIL CO. (OHIO) AND SOHIO PETROLEUM CO.

	Cleveland No. 1 refinery	Toledo	Lima	Latonia	Cleveland No. 2 refinery
Crude capacity, B./C.D.	45,000	21,000	39,000	16,500	.....
Pipe still, vacuum*	15,000	.....	10,000	11,000	.....
Thermal reforming*	9,000	5,800	8,500	3,000	.....
Thermal cracking*	11,000	6,400	4,500	6,000	.....
Catalytic cracking*	16,000 (T.C.C.)	.....	22,500 (F.C.C.)	.....	.....
Catalytic polymerization, bbl. (poly)	700	500	550	400	.....
Coking capacity	.....	6,300	10,000	.....	.....
Catalytic reforming	.....	.....	.....	.....	.....
Alkylation unit (sulfuric)	.....	2,000 (Lt. alky.)	.....	.....	.....
Asphalt plant	6,000	.....	.....	3,200	.....
Deasphalting, propane	.....	.....	1,000	.....	.....
Lube, conventionally refined	.....	.....	.....	.....	1,200
Lube, solvent extracted (propane deasphalted and M.E.K. dewaxed)	.....	.....	1,500	.....	.....

*Fresh feed.



DERRICK JOB . . . A Rowan Drilling Co. rig, working on a 14,000-ft. contract for Skelly Oil Co., near Townsend pool.



MAST JOB . . . Helmerich & Payne, Inc.'s Rig. 24, comprising a 133-ft. cantilever-type unit mounted on a Model 80 rig powered by three LRO engines. Picture taken at Magnolia Petroleum Co. 5 T. D. Pope, in Denton field.

DRILLING REPORT—SOUTHEAST NEW MEXICO

Lea County Leads Permian Basin Activity

Nineteen wildcats strung along 90-mile front; 113 rigs active in development of 49 oil and gas fields

by Joseph A. Kornfeld
District Editor

LEA COUNTY in the southeast corner of New Mexico continues to improve its leading position in exploratory and development drilling throughout the Permian basin. The number of rotary drilling rigs active in this county has risen to another high of 132 for the week ended January 26, 1953. This activity is currently comprised of 19 exploratory wells and 113 developmental wells.

Producing importance . . . The prominence of Lea County in the producing picture in the Permian basin is reflected in the fact that the current crude-oil allowable for February 1953 (by the New Mexico Oil Conservation Commission) totals 180,106 bbl. daily, allocated to 4,914 wells. Of this total, marginal allocation is 63,095 bbl. shared by 3,458 wells; 116,346 bbl. is allocated to 1,456 nonmarginal wells and the remainder of 665 bbl. allocated by acreage adjustment.

Exploratory wells . . . A total of 19 exploratory wells are scattered along a 90-mile front extending from the Cross Roads area in the northern part of the county to prospects lying west of Cooper-Jal field in the southern part near the Texas boundary. Of these 19 wells, 9 are scheduled for depths of from 12,000 to 14,000 ft. and 15 are in the 10,000 to 14,000-ft. range. This tabulation is shown in Table 1.

TABLE 1
Range of Depths of Wildcat Wells in Lea County, New Mexico

Range—ft.	No. wells in each group
4,000-5,000	1
5,000-6,000	0
6,000-7,000	0
7,000-8,000	1
8,000-9,000	1
9,000-10,000	1
10,000-11,000	2
11,000-12,000	4
12,000-13,000	4
13,000-14,000	5
Total	19

Companies engaged in exploratory operations in Lea County include Continental Oil Co., Gulf Oil Corp., Humble Oil & Refining Co., Lawton Oil Corp., George P. Livermore, Ralph Lowe, Mid-Continent Petroleum Corp., Pure Oil Co., Rowan Drilling Co., Sinclair Oil & Gas Co., Skelly Oil Co., James H. Snowden, Sun Oil Co., Texas Pacific Coal & Oil Co., Tide Water Associated Oil Co., George H. Coates et al, Union Oil Co. of California, Wilshire Oil Co., Inc., and Wilson Oil Co.

Drilling objectives include Permian, Pennsylvanian, Devonian, and Ordovician reservoirs producing now in nearby fields. Drilling equipment used by contractors on these deep wildcats and

modern operating techniques is reviewed elsewhere in this article.

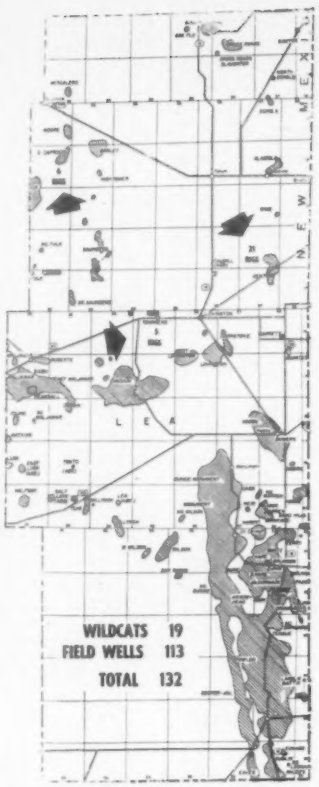
Developmental wells . . . A group of 113 developmental wells now are working on development of 49 fields scattered throughout the county as shown in the accompanying oil and gas plat of Lea County. A breakdown of rigs by fields is shown in Table 2.

Heaviest concentration of rigs is in the **Denton** area where 21 are working; of this total, 12 are active on development of 12,600-ft. Devonian reservoir and remaining 9 for development of 9,600-ft. Wolfcamp pay. Wells are drilled originally to the Devonian in this field and completed in that horizon; twin wells are completed in the shallower Wolfcamp based on test data logged in the Devonian test.

TABLE 2
Rig Summary by Fields, Lea County, New Mexico
(Status as of January 25, 1953)

WILDCATS		19
Field wells—	Contract depth	
Bagley-Devonian	9,500	1
Blinebry	7,000	1
Bough	9,700	1
Caprock, East-Devonian	11,250	6
Cooper-Jal	3,800	1
Corbin	4,300	1
Cross Roads	9,700	1
Cross Roads	12,250	1
Denton-Wolfcamp	9,600	10
Denton-Devonian	12,600	12
Dollarhide West, Queens	3,760-3,900	3
Dollarhide West	6,800	2
Dollarhide West-Devonian	8,000	4
Drinkard	6,680	3
Drinkard	6,680-7,100	3
Echols	11,610	2
Eunice-Monument	3,900	1
Eunice South	3,395	1
Fowler	10,500-10,800	3
Gladiola-Wolfcamp	11,800	4
Gulf 1 "BS" State†		1
Halfway	3,500	1
Hare	8,200	3
Hobbs	4,350	1
Knowles	12,500	1
Langlie-Mattix	3,700	5
Lazy J (Tulk)	9,800	1
Lovington-Abo	8,400-8,500	4
Lovington East-Pennsylvanian	12,300	1
Lovington-Paddock	6,400	1
Maljamar	4,300	1
Mescalero-Devonian	10,300	3
Monument	4,150	1
Monteith-Strawn†	11,500	1
Moore-Devonian	10,700	4
Saunders	9,900-10,200	5
Schenck*	12,000	1
Sinclair 1-245 State†		1
Skaggs	3,500	1
Skelly T-1 Mexico		1
Teague-Ellenburger	9,800	3
Terry-Blinebry	6,015	1
Townsend-Wolfcamp	11,600-12,000	5
Warren, North-McKee	9,400	2
Wentz-Abo	8,000	1
Wilson	4,100	1
Wilson 1 Skelly-State†		1
Subtotal field wells		113
Lea County total		132

*Unofficial name. †Field name not designated.



LEA COUNTY ACTIVITY is shown here with arrows pointing to the heavier concentrations of drilling rigs. (Map courtesy Midland Map Co., Midland, Tex.)

Dollarhide West has a concentration of nine rigs divided among the 3,760-3,900-ft. Queens (Permian) reservoir, the 6,800-ft. Pennsylvanian reservoir, and the 8,000-ft. Devonian pay.

Other Devonian activity is highlighted by six rigs in **East Caprock-Devonian** field, four in **Moore-Devonian** and three in **Mescalero-Devonian.**

In addition to the Wolfcamp development at Denton, there are five rigs seeking this objective in the 12,000-ft. development at **Townsend** and four in the **Gladiola** area. Oil accumulations in the Wolfcamp (Permian) formation in Lea County are related directly to structural origin as contrasted to Wolfcamp reef buildup on pre-Permo-Pennsylvanian terraces in Terry County, Texas, to the east.

Drilling Contractors

Drilling contractors now active in Lea County include:

J. C. Crane, Hobbs, N. M.; Frank Frawley Drilling Co., Tulsa; Great Western Drilling Co., Midland; Livermore Drilling Co., Lubbock; Lawton Oil Co., Shreveport; Loffland Brothers Co., Tulsa; McVay-Stafford, Tulsa; Noble Drilling Co., Tulsa; Parker Drilling Co., Tulsa; Rowan Drilling Co., Fort Worth; Southeastern Drilling Co., Dallas; Big West Drilling Co., Midland-Fort Worth; Choya Drilling Co., Midland; E. F. Moran, Inc., Tulsa; Fran Drilling Co., Odessa; Frank Woods Drilling Co., Odessa-Wichita Falls.

The list includes Makin Drilling Co., Hobbs, N. M.; Milhoan Drilling Co., Oklahoma City; Olsen-Blount, Jal, N. M.; M. O. Rife Drilling Co., Odessa; Admor Drilling Co., Odessa; Brahaney Drilling Co., Inc., Midland; Corbett Drilling Co., Tulsa; Dixilyn Drilling Co., Odessa-Fort Worth; Helmerich & Payne, Inc., Tulsa; McAlester Fuel Co., McAlester, Okla.; Sabine Drilling Co., Shreveport; Warren & Bradshaw Drilling Co., Tulsa; Oil States Drilling Co., Dallas; Tri-Service Drilling Co., Midland; Cactus Drilling Co., Midland-San Angelo; Blount Drilling Co., Midland; Creekmore Drilling Co., Tulsa; Davidson Drilling Co., Inc., Odessa-Fort Worth.

Additional contractors are: Gardner Brothers Drilling Co., Odessa-Dallas; Gackle Drilling Co., Hobbs-Fort Worth; Haines & V. T. Drilling Co., Odessa; Hissom Drilling Co., Tulsa; Penrod Drilling Co., Shreveport; Trinity Drilling Co., Dallas; Thompson-Carr, Inc., Houston; Baker & Taylor, Silver, Tex.; Bosworth Drilling Co., Inc., Odessa; Delta Gulf Drilling Co., Tyler; Lee Drilling Co., Tulsa; H & S Drilling Co., Tulsa; Simmons Drilling Co., Tulsa; Sharp Drilling Co., Midland-Kermit; M. J. Delaney Co., Dallas-Odessa; Drilling & Exploration Co., Inc., Midland-Hobbs; Llano Drilling Co., Midland; T. & C. Drilling Co., Midland-Tulsa; Western Drilling Co., Longview; Coroco Drilling Co., Odessa; Guy Mabee Drilling Co., Midland-Odessa.

Company rigs active include those of Superior Oil Co., Henry Bloch & Sons, Ralph Lowe, Wilshire Oil Co., Magnolia Petroleum Co., and Shell Oil Co.

Parker Drilling Co.

Parker Drilling Co. operates 14 rigs at this time in Lea County. These comprise two Model 50, four Model 75, six Model 100, and two Model 125. These are employed variously in development of the Abo objective found at 8,400 ft., the Wolfcamp at 10,000, the Strawn at 11,200, and the Ellenburger at about 12,500 ft.; these depths are applicable for the Denton area in the northern part of the county.

Parker employs 136-ft. conventional steel derricks mounted on structures of either the 8 or 10-ft. height. Two QRC blowout preventers are placed in the substructure. Initially, Parker drilling crews string six lines to set surface casing and add two lines when a depth of 7,000 ft. is reached; in all cases, 10 lines are used to set the long string of either 5½ or 7-in. pipe.

Wildcat Wells

Typical of drilling-rig equipment on a 14,000-ft. wildcat in the Townsend

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area is Parker's Model 125 rig now drilling at Pure Oil Co.'s State B-1 in the northwest quarter of Section 10-16s-35e. The draw works is powered by three LRO engines. Mud pumps are a C-250 (7¼ by 15-in.) and a C-350 (7¼ by 18-in.). This well is contracted for 14,000 ft.

Bore-hole practices . . . The following summaries of bore-hole and casing practices illustrate two applications being used at this time on wildcat wells in Lea County. The first is for a deep well in the Townsend area, which follows the following procedure:

Bore-hole size (in.)	Casing diameter (in.)	Casing set (ft. depth)
17½	11¾	400
12¼	8⅝	4,600
8¾	5½	14,000

On another wildcat in this same area, instead of setting a string of 11¾-in. surface pipe in a 17-in. hole, operators set a 13⅜-in. surface casing and cemented to surface. Another deviation from the casing practice is to set a 9⅝-in. casing in a 12¼-in. protection hole. For the long string, 7-in. pipe is set in the 8¾-in. long hole. Thus the bore-hole and casing practice is summarized as follows:

Bore-hole size (in.)	Casing diameter (in.)	Casing set (ft. depth)
17½	13⅜	350
12¼	9⅝	4,600
8¾	7	11,600

Straight-hole drilling . . . In drilling Devonian objective wells in Lea County, Parker crews employ about 30,000 lb. on the bit to a depth of about 11,000 ft. or the top of the Devonian at which point drillers slack off to 15,000 or 20,000 lb. in order to avoid excessive bore-hole deviations. Crews make up about 16 drill collars under the protection casing to add the necessary weight for stabilization to the drilling string.

Fuel . . . This firm uses gas for 13 of its rigs and on one of its Model 125 rigs southeast of the town of Eunice, butane is used for fuel.

One of the major problems in drilling operations in Lea County is obtaining a satisfactory supply of water to drill. Where surface waters are not abundant, Parker buys water hauled in by water-supply companies.

Carl B. King Drilling Co. of Texas, Midland, is using its Rig 7 on a 14,000-ft. contract for an exploratory test for Continental Oil Co. at 1 Anderson Estate, in Section 11-16s-32e, in the West Lovington area; it is now drilling below 12,513 ft. The Model 100 rig is powered by three G-510 engines with a single LRO on standby. Mud pumps are a C-250 and a C-350. A standard 136-ft. steel derrick with 10-ft. substructure is used.

The 17½-in. surface hole was cut to 379 ft. where the 13⅜-in. pipe was set and cemented with 350 sacks. Protection hole was 9-in. and the 7-in. casing was landed at 12,250 ft.; 1,000 sacks were placed behind the pipe.

Loffland Brothers Co.

Loffland Brothers Co. is running five rigs in Lea County comprising four Model 75 and one Model 100 rigs.

In the Denton area, Loffland has a Model 100 drilling for Gulf Oil Corp. It is powered by three 6G510 engines burning gas or butane. Mud pumps are a C-250 and a C-350. Standard 136-ft. 30 by 30-ft.-base steel derrick is mounted on a an 8-ft. substructure.

Two of the Model 75 rigs are equipped almost identically with three LRO drilling engines, C-250 and CA-16 mud pumps. They have 133-ft. mast with 8-ft. substructure. Both are working for Gulf in Fowler and Teague-Ellenburger fields.

In Moore field, a Model 75 rig is working for The Texas Co. It is equipped with 6G510 engines and has C-250 and C-350 pumps. The rig is mounted on a 131-ft. mast.

On a wildcat location in the same area, Loffland has a Model 75 working for The Texas Co. powered by three V-12 drilling engines, and equipped with C-250 and C-350 pumps. It is a mast job.

Helmerich & Payne, Inc.

Helmerich & Payne, Inc., currently operate four deep rigs in Lea County. These include two Model 96 rigs for Magnolia Petroleum Co. and Sinclair Oil & Gas Co., a Model 130 rig for Magnolia, and a Model 80 also for Magnolia, the latter on 133-ft. mast.

Derricks . . . Helmerich & Payne employs 136-ft. conventional steel derricks mounted on 10-ft.-high substructures. Draw works is driven by three internal-combustion engines employing gas or butane fuel. Mud pumps are 20-in. stroke. Swivel and hooks are 350-ton capacity.

Rigging practices employ six lines to set conductor pipe with eight lines for protection or salt string. However, on the Model 80 rig, 10 lines are strung initially. On the other rigs, 10 lines are required to land the long string.

Bore-hole sizes . . . Ellenburger or Devonian wells drilled in Lea County require the following bore-hole, casing, and cementing program which is typical of current practices. A 17½-in. conductor hole is cut for the surface string in which 13⅜-in. pipe is set and cemented at 400 ft., with cement run to the surface.

The protection string or so-called salt string is cut with a 12¼-in. bit to an average depth of 4,600 ft.; a string of 9⅝-in. (or 8⅝-in.) pipe is run.

Companies such as Magnolia Petroleum Co. adopt a full-hole cementing practice on the salt string. Long hole is 9-in. pipe carried to the top of the Ellenburger, generally on open hole or barefoot completions. The oil string is usually 7-in. (or in some cases 7⅝-in.) set and cemented on top of the formation, usually with 250 sacks.

Drill-collar practice . . . Helmerich & Payne drilling crews pick up four to five 8-in. collars for making hole under the surface pipe. When the salt string is set and cemented, these drill collars are pulled and a new string of 28 to 30 6-in. drill collars are run; weights of from 25,000 to 30,000 lb. are carried on the bit. This assists in preventing crooked-hole conditions usually encountered in the Pennsylvanian limestones. For example, in Denton field at Magnolia 1 Koch, deviations as high as 5° were encountered in the Pennsylvanian deep limestone horizons.

Pump pressures from 1,000 to 1,200 psig. are employed. This contracting firm uses 20-in. mud pumps invariably throughout its Lea County drilling program.

Mud program . . . Mud weight is held to about 9.2 lb. per gallon although at times weight is carried as high as 9.5. Viscosities which may start with around 36 seconds A.P.I. will be increased to as high as 80 by the time the Devonian or Ellenburger objectives are reached. Filter cake is kept as high as 3/32 in. to avoid hole caving when pulling drilling pipe through thick shale sections.

Water does not pose a drilling problem in Lea County. Plentiful water supplies are obtainable from water wells which encounter shallow aquifers at depths ranging from 160 to 180 ft., depending upon what part of the county the field is situated.

Great Western Drilling Co.

Great Western Drilling Co., of Midland, is operating four medium rigs in Lea County, two of which are in the Tatum area in the central northern part of the county and the others in the Lovington area in the central part.

The firm's Rig 9 is rigging up on a 9,500-ft. contract for Texas Pacific Coal & Oil Co. It uses an 8 by 20 FXL pump with a 7¼ by 14-in. standby. Rig 18, working on a 11,200-ft. contract, also has an 8 by 20 FXL with a 7¾ by 14-in. standby. Both rigs are equipped with 136-ft. jackknife masts with 8-ft. substructures.

Cementing practice . . . In the Tatum area, Texas Pacific cements the 9⅝-

in. protection pipe to the surface which requires about 1,600 sacks.

On the long string of 7-in. run in an 8¾-in. hole, two-stage cementing is done in the Tatum area. Initially from 400 to 500 sacks of cement are run when the plug is bumped; however, in some cases Great Western reports that there has been loss of circulation. To offset this condition, a temperature survey is run and the top of the cement gun-perforated preparatory to running an additional 1,000 sacks of cement. Quick-set cement is run with 3 to 4 per cent jel and Stratacrete.

Rig 26, working for Humble 6 miles west of Lovington, is mounted on a 136-ft. steel derrick with 8-ft. substructure. Along with the 8 by 20-in. FXL pump is a 7¼ by 18-in. 18-P standby unit.

On a 12,000-ft. job for Texas-Pacific, Rig 17 is equipped with a 133-ft. jackknife mast. Together with the 8 by 20-in. FXL mud pump a TC-16 7¾ by 16-in. standby facility is provided.

Drill-collar practice . . . Crews start up under the surface pipe with 8-in. drill collars. From 6 to 12 are required to drill the intermediate or protection hole.

Great Western crews add 6¼-in. drill collars in cutting the long hole and by the time 11,000 or 12,000 ft. contract depth is reached, as many as 18 collars are in the string.

Bore-hole practice in the Lovington area is to cut a 17½-in. hole to 300 or 350 ft. and set a string of 13⅜-in. pipe. On the protection string, Great Western crews cut a 12¼-in. hole and set 9⅝-in. pipe. An 8¾-in. long hole is cut to set 7-in. pipe.

Arrow Drilling Co.

Arrow Drilling Co. currently operates two rigs in Lea County. These comprise a Model J-1,000 and a Model M-10,000. They are employed in development of Echols and North Warren fields.

Arrow's Rig 21 is now drilling for Shell Oil Co. at its State A-2 in Section 2-11s-37e and is rotating below 11,200 ft. at this writing. It is powered by two 450-hp. gas-butane engines driving an 8 by 20-in. mud pump. A 5 by 10-in. mud pump auxiliary unit is powered by a 145-hp. GKU engine. The conventional 136-ft. steel derrick with 30-ft. base is mounted on a 7-ft. substructure. Blowout assembly is a double-gate 6,000-psi. test unit.

Rig 25 is drilling for Tide Water Associated Oil Co. at its 1 Tricky-Dressen, Section 7-20s-38e. This Model M-10,000 rig is powered by two LRO gas-butane engines driving a C-350 pump. An auxiliary pump unit is comprised of a C-250 mud pump powered by a single LRO engine. Derrick and substructure arrangement is identical with Rig. 21.

Although Arrow now is running only two rigs in Lea County, during 1952 this firm operated four rigs for a total footage (completion basis) of 84,834 ft., for three Model J-1,000 and one Model M-10,000 rigs employed continuously throughout that year.

In Lea County operations, drilling contracts are written on footage basis to 9,500 ft., at which point day-work rates are entered. The company furnishes all bits, mud, fuel, and water. Drill-pipe rental is figured on the basis of 1½ cents per foot.

Drilling Processes

In Echols field, Arrow has followed the following bore-hole, casing, and cementing practices for Shell Oil Co. on developmental lease. These are tabulated as follows:

	Bore hole	Casing size	Seat	Cement
Surface	17½	13⅜	350	325
Protection	11	8⅝	4,250	3,300
Long	7⅞	5½	11,610	350

Arrow has held bore-hole deviation to less than 1° through the Devonian on a developmental well in Echols field. This has been brought about largely through the use of a substantial string of 6-in. drill collars. A total of 19 collars are picked up under the salt string and this number maintained until a depth of 10,500 ft. is reached when crews remove 4 collars; 15 collars are kept on the string until contract depth is reached. The following tabulation shows the straight-hole drilling record on this well:

Depth	Deviation
6,080	1°
7,600	1°
8,425	¼°
9,280	0°
10,306	¾°
10,700	¼°
10,980	¾°
11,235	1°

Denton field . . . On a 9,500-ft. Wolfcamp developmental well working for Phillips Petroleum Co., Arrow crews employ conventional bore-hole, casing, and cementing practices. These differ from those followed in Echols field in that the protection string is set about 400 ft. lower than the setting depth in Echols field; moreover, the amount of cement placed behind the protection casing is only 2,150 sacks as compared to 3,300 used in Echols field.

Saunders Outpost

Frank Frawley Drilling Co., Tulsa, operates a Model U-20 rig in Lea County for Sinclair Oil & Gas Co., which is capable of drilling from 10,000 to 12,000 ft. using 3½-in. drill pipe, delivering a maximum of 1,000 hp. The 26½-in. high-speed hydraulic brake, automatically controlled and water regulated, is mounted inside the draw-works case.

Prime movers are three VU-280 gas-butane engines. Mud pumps are 7¼ by 14-in. and 7¾ by 16-in. The rig is mounted on a 136-ft. conventional steel derrick with 10-ft. substructure.

Sinclair's bore-hole and casing program on this particular well currently being completed (1-245 State, 330 ft. from the east line and 2,310 ft. from north line, Section 28-13s-33e, 3½ miles north of Saunders field) employed the following bore-hole and casing program:

	Bore hole	Casing size	Seat	Cement
Surface	17½	13⅜	326	325
Protection	12¼	8⅝	4,021	1,500
Long	7⅞	5½	9,700	

Frawley has used 5 9/16-in. drill pipe in cutting the protection hole. In cutting the long hole, 4½-in. drill pipe was used. However, on future developmental wells in this area, this contracting firm plans to switch to 3½-in. drill pipe. One major advantage in using the smaller-diameter pipe is that it speeds up tripping time thereby increasing the amount of time available for actual rotating.

Drill-collar practice . . . Crews start with a single 8-in. drill collar under the surface pipe. Additional drill collars are added continually to the string until a maximum of six are employed. After the shoe is drilled under the protection string, 6-in. drill collars are added continually until a maximum of from 20 to 24 collars are employed when total depth is reached.

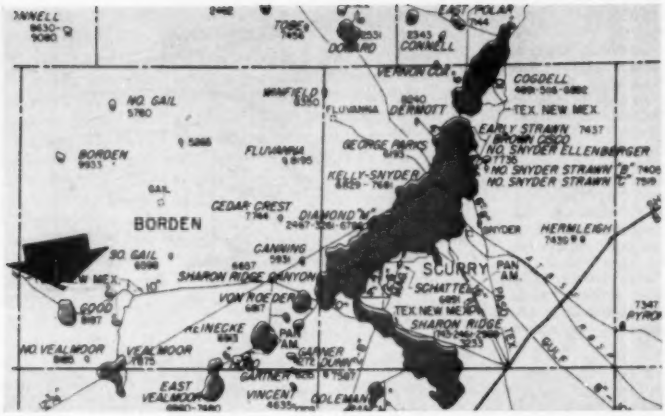
Creekmore Drilling Co.

Creekmore Drilling Co. has two Titan rigs working for Amerada Petroleum Corp. in Lea County, both rated at 12,500-ft. capacity.

North Warren-McKee . . . Rig 3, equipped with a conventional 136-ft. derrick, has 3 LRO 350-hp. engines behind the draw works. Pumps are a D-500 6¾ by 16-in. and a C-350 7¾ by 18-in.

It is working at 2 Mary J. Raley in Section 8-20s-38e, below 5,000 ft. The 13⅜-in. surface pipe was cemented at 296 ft. with 200 sacks. Protection pipe was 9⅝-in. set at 3,710 ft.; 1,775 sacks of cement were placed behind the pipe.

East Caprock-Devonian . . . Rig 7, mounted on a 136-ft. mast, also has 3 LRO 350-hp. engines behind the draw works. Pumps are a D-500 and a G-300 (7¾ by 18-in.). This rig is working at 2 ECD State in Section 2-11s-32e, below 7,000 ft. Protection pipe is 8⅝-in. set at 3,585 ft. with 1,500 sacks.



CANYON REEF oil fields in West Central Texas are shown in the above map and arrow points to Good oil field of Borden County which is discussed in this article (Fig. 1).

Prolific Limestone Reef Production . . .

in Good Field, Borden County, Texas

by H. Judson Brady

A strong water drive acting on a reef limestone reservoir, containing an undersaturated sweet crude 8,100 ft. deep with as much as 486 ft. of closure above water, has resulted in 3 years of excellent production operation. The adjustment of total field withdrawal rates after the first 2 years of operation reflected some very interesting characteristics in the reservoir pressure behavior.

GOOD field, in southwestern Borden County, Texas and located approximately 30 miles north of Big Spring, has produced for more than 3 years. For all practical purposes it is completely developed, consisting of 49 producing oil wells, 4 dry holes, 1 abandoned producer, and 1 well that has been temporarily removed from the allowable schedule. Six wells are now produced by artificial means which leaves 43 flowing wells of the total.

Three operators are represented in the field: Seaboard Oil Co. of Delaware (operator), and Pan American Production Co. jointly own 30 wells. Condor Petroleum Co. owns 13 wells and The Texas Co., 6 wells.

Good field was one of the early fields in West Texas to produce from the Pennsylvanian Canyon reef limestone.

On March 28, 1949, at a total depth of 7,940 ft. and after penetrating 40 ft. of reef limestone the Seaboard-Pan American 1 T. J. Good, a rank Borden County wildcat, flowed 22 bbl. of oil per hour from the bottom 20 ft. of the hole on a drill-stem test. The well was subsequently cored to a total depth of 8,010 ft. (5,396 ft. subsea) and potentialed on April 14, 1949, for 448 bbl. of oil per day through a ¼-in. tubing choke. This was the discovery well.

Geological Data

Good field is located on the southwestern end of the trend of Canyon reef fields that include Vealmoor, East Vealmoor, Reinecke, Von Roeder, the Scurry County reef fields (Sharon Ridge Canyon, Diamond "M," Kelly-Snyder, Cogdell) and Salt Creek field in Kent County.

Core-hole and other regional subsurface information indicated a possible subsurface anomaly which caused Seaboard and Pan American to undertake considerable reflection seismograph work on the area. The following results prompted these two companies to undertake development with Seaboard appointed as operator. Condor Petroleum, the original lessee, retained the southeast quarter of each leased section for its own operations.

Th Pennsylvanian section present in this area consists of 400 ft. of shale with scattered limestone streaks followed by approximately 1,200 ft. of reef limestone with 200 to 400 ft. of limestone and shale below this. The entire reef section was penetrated by the Hunt 1 Clayton on the east side of the field. This well was drilled to a total depth of 10,200 ft. into the Ellenburger and encountered approximately 1,000 ft. of continuous limestone below the field oil-water contact.

The reservoir media may be described as a slightly fossiliferous gray to white limestone with generally medium crystalline texture and varying vertical fracturing. The porosity and permeability are highly irregular as indicated by core analyses and porosity can be described as pin point to slightly vugular to very vugular. Large penetrated sections have been found to contain no producible porosity. The 17 T. J. Good on the southwest edge of the field penetrated 232 ft. of reef above water which was dense and nonproductive. It was acidized with 82,500 gal. of acid in four successive operations and shot with 660 qt. of nitroglycerin in an attempt to obtain production. All these efforts failed and the well was abandoned. The 29 T. J.

THE AUTHOR

H. Judson Brady is district engineer for West Texas district of Seaboard Oil Co. of Delaware in Midland. After joining the company in 1948, he worked in the South Texas district at Corpus Christi for 2 years. Prior to his present assignment, he was field engineer for the same concern in Good and Vealmoor fields, Howard and Borden counties, Texas. He graduated from University of Oklahoma in 1948 with a B.S. degree in petroleum engineering, and served for 2 years in the Naval Air Corps in World War II.

Good, a west offset well to the No. 17 well, also encountered dense and nonproductive reef above the water.

Drilling and Completion

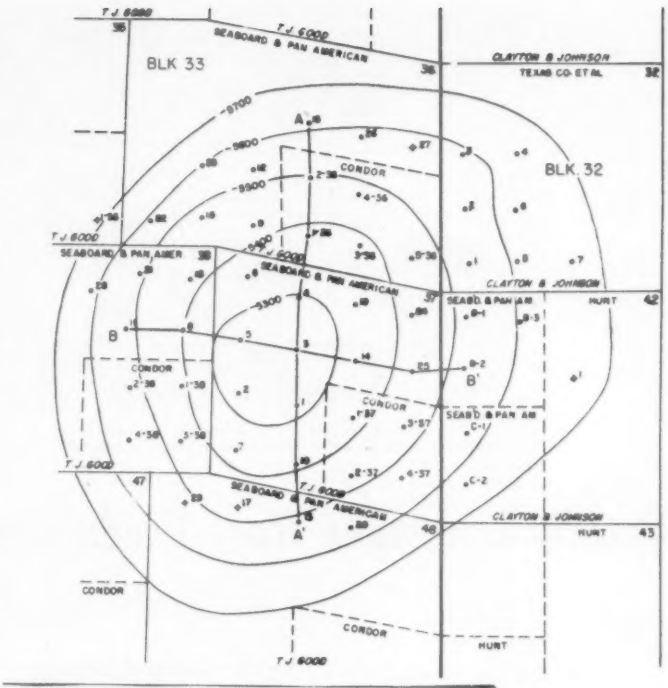
The method of completing wells in Good field followed very much the same pattern. If no high-pressure air was anticipated in the Yates sand a 17¼-in. hole was drilled and 400 ft. of 13⅜-in. surface pipe set. If air was expected the surface casing was set at approximately 1,300 ft. The purpose of this procedure was not to combat the air blow from the Yates but rather to case off the red beds which heaved and caved following an air blow and seriously delayed drilling until intermediate pipe was set.

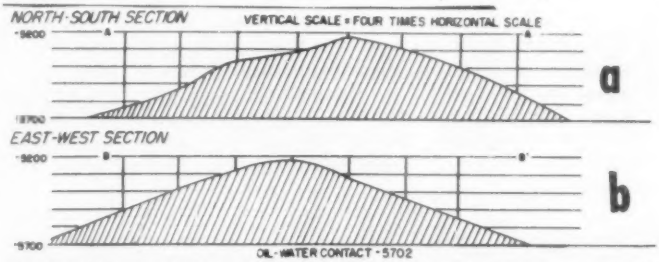
In order to pursue normal drilling a rotating head was used in conjunction with the blowout preventer when an air blow was encountered. This permitted drilling with the air blowing controlled through a flow line.

After surface casing was set a 12¼-in. hole was carried to approximately 3,125 ft. in solid San Andres lime and 9⅝-in. intermediate pipe set at this depth to case off the salt beds. The well was then drilled with an 8¾-in. hole until the reef was penetrated and a production string of 7-in. casing set in the top of the pay.

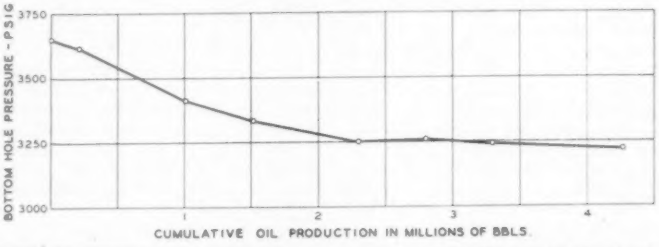
A 6⅛-in. hole was subsequently drilled to a predetermined depth depending on the porosity encountered and the height above the oil-water contact. A string of 2½-in. tubing was hung, the mud displaced with water, the water with oil, and the well allowed to come in under its own pressure. An average of 60 rock bits were used per well and the average time consumed to drill and complete a well was 47 days from spud date to well completion date.

It was common procedure to mud up at a predetermined distance above the expected reef top with a conventional fresh-water mud containing considerable fibrous lost-circulation materials and to penetrate the reef with mud having a weight of approximately 9.5 lb. per gallon. This weight was necessary in order to provide a reasonable safety factor due to the difficulty of keeping the hole full because of a lost-circulation zone at about 5,000 ft. From 10 representative wells drilled by





SUBSURFACE STRUCTURAL CONTOUR MAP of Good field contoured on top of the Canyon reef (contour interval: 100 ft.); this map carries lines of section identifying cross-sections below showing development of Canyon reef above field oil-water contact of 5,702 ft. subsea as follows: A—North-South section, A-A'; and B—East-West section, B-B' (Fig. 2).



PRESSURE-PRODUCTION relationship chart for Good oil field. Decrease in rate of pressure decline is due to reduction in field allowable which permitted water drive mechanism to become effective (Fig. 3).

Seaboard, the cost of mud varied from $2,000 to $12,000 and averaged approximately $5,000 per well.

Another problem of importance was the relatively short drill-pipe life. Magnetism of the drill pipe, crooked-hole trouble, sulfur-water influx into the drilling fluid, all combined, shortened drill-pipe life below the average for drilling of this depth. The crooked-hole problem was encountered over the entire field but was intensified in the south and east part.

The critical depth at which the hole tended to go off fell between 4,800 and 5,300 ft. and, ordinarily, if the hole went crooked it would be straight again between 6,000 and 6,500 ft. The crooked-hole trouble naturally added to the cost of well completions, but with reasonable diligence, wells could be completed with a comparatively vertical hole.

Lost Circulation

Loss of circulation was generally encountered in practically all wells and in varying degrees. This constituted the greatest single drilling problem of the field. The zone in which loss of circulation occurred lies in the San Andres lime between 4,900 and 5,300 ft. Several wells were drilled and completed by combating the loss of circulation with fibrous mud materials while others could only be drilled after cementing this zone. Generally, throughout the field it was necessary to cement this zone after penetrating and often again after the well was mudded up.

Of five representative Seaboard wells, the amount of cement necessary to regain circulation averaged 250 sacks and the average time consumed due to lost circulation was 3 days. It is evident that loss-of-circulation problems added materially to the cost of drilling wells in this field.

Reservoir-Rock Characteristics

The reservoir structure may be described as a symmetrical cone essentially round at the base and inclining almost uniformly toward an apex on which the 3 T. J. Good well is located with 486 ft. of gross pay. This conical structure on the basement reef is made up of superimposed layers of dense and porous limestone that are sometimes correlative between wells. Communication is known to exist between the porous zones either through lenses, in continuities, or fractures, and it is evident that the structure as a whole is one reservoir.

Six Seaboard-Pan American wells were diamond cored throughout the field development and from analyses made on this core it was determined that the reservoir media have a weighted average porosity of 8.33 per cent of the bulk volume, with a range of from 1 to 19 per cent.

The weighted average permeability is 52.5 md. with a range from 0.1 to 1,260 md., and the weighted average residual water saturation is 36.0 per cent of the pore volume with a range of 33.4 to 38.6 per cent.

The gross pay thickness as determined from 30 Seaboard-Pan American wells ranges from 73 to 486 ft. with an average of 246 ft. per well. It has been estimated that over-all the net pay comprises 50 per cent of the gross pay.

The original oil-water contact was established by drill-stem tests and core analyses at 5,702 ft. subsea.

Reservoir Fluid Properties

A bottom-hole sample was taken from the 1 T. J. Good well shortly after its completion. The measured saturation pressure of the reservoir oil was 2,022 psig. at 140° F. and differential liberation of gas from solution at 140° F. yielded 989 cu. ft. of gas measured at standard conditions per barrel of stock-tank oil at 60° F. The bubble point of the reservoir oil was originally 1,628 psi. below the original reservoir pressure of 3,650 psig. at datum of 5,450 ft. subsea.

Under essential field operating conditions of single-stage separation (approximately 40 psig.) the formation-volume factor was originally 1.5240 bbl. of saturated oil at 140° F. per barrel of stock-tank oil at 60° F. by flash liberation. The average gravity of the oil produced by this separator condition is 43.2° A.P.I. at 60° F. and the gravity compared to air of the produced gas is 0.9078. Separator gas-oil ratio is approximately 800 cu. ft. per barrel.

Production Problems

The comparatively dense sections encountered in some wells have necessitated acidization in an attempt to increase production. Acid treatment to obtain production from wells penetrating dense limestone or to increase the productivity of small producers has had very little, if any, success.

Water production, as of August 1, 1952, occurred in 11 wells in varying percentages. Of the 11 wells 6 are produced by rod pumps and the other 5 are still flowing. As a general statement all water producers are edge locations but as a rule the wells were bottomed high enough to prevent the early water entry that has occurred in many cases.

The reservoir apparently has very good vertical permeability in most of these wells as evidenced by this early water entry. Initial water production was observed in August 1950; on January 1, 1951, 3 wells were making water, and on August 1, 1952, 11 were water producers. Characteristically, once water appears in a well the percentage increases very rapidly together with a corresponding decline in oil rate. However, after the oil rate has declined to a certain amount, the rate of decline is much less but the water cut continues to increase slowly until the well ceases to flow thereby necessitating a pumping unit.

In one well the intrusion of water was so rapid that it produced but little oil after the appearance of water. The 27 T. J. Good was completed on March 7, 1951, with a total depth 52 ft. above the water-oil contact. Shortly thereafter it loaded with salt water and died. No acidization was undertaken prior to the cessation of flow and after a lengthy and costly period of remedial work the well was abandoned. This is a prime example of the rapidity with which water enters some wells in the field.

Plugging back in the open hole in an attempt to shut off water in this field has not been successful in edge wells. Considerable section is a prerequisite and then the results are sometimes doubtful. Practically all materials have been tried with indifferently satisfactory results to date.

The disposal of the produced water has not presented a problem as the San Andres zone in the 17 T. J. Good was converted to a disposal well by severing the casing at 5,100 ft. with explosives.

In summation the major production problem that occurs in this field is the control of salt water.

Producing History Bottom-Hole Pressure

Upon discovery and previous to the establishment of MER and field rules by the Railroad Commission, Seaboard tested 1, 2, and 3 T. J. Good wells each at 225, 275, and 325 bbl. of oil per day for 30 days at each rate. These tests were made with the simultaneous recording of bottom-hole pressures in order to determine a basis for MER. On presentation of this information to the commission at a hearing the MER for this field was set at 275 bbl. of oil per producing day.

Field rules call for 1,200 ft. between wells, 560 ft. from lease lines, 40-acre proration units with allowable allocations based on 100 per cent acreage. The field produced under these conditions of allowable until April 1, 1951, at which time 44 producing wells had been drilled and 2,323,190 bbl. of oil had been produced by all operators. The bottom-hole pressure had declined

(Continued on page 83)

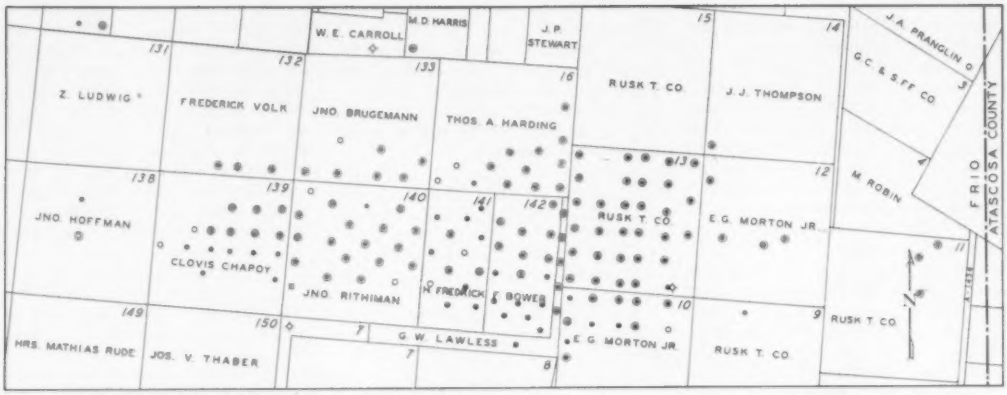


Fig. 1—Map of Big Foot field showing well locations. Wells which have had fracturing treatment are indicated by double circles.

BEFORE . . .

40,000—

AFTER . . .

105,000—

BARRELS MONTHLY

Marginal field transformed into flowing

by John C. McCaslin
District Editor

HYDRAULIC formation fracturing of the Olmos sands at Big Foot field, northeastern Frio County, Texas, has resulted in an active drilling campaign in the once marginal producing field.

Big Foot field, located a short distance downdip from the Balcones fault trend in Frio County, Southwest Texas, was discovered in February 1949 following detailed subsurface stratigraphic studies and seismic and core-test-data evaluation by Shell Oil Co.

The oil reservoir, at about 3,500 ft., is a stratigraphic trap formed by the updip pinchout of the Olmos (Upper Cretaceous Navarro - Taylor) sands against a southeast dipping unconformity. Permeability of the sand runs somewhere between 1 and 10 md., porosity from 20 to 25 per cent, and connate water from 60 to 65 per cent. The extremely low permeability and the unusually high connate-water content account for the low productivity of this field.

Production in the field, prior to fracturing treatment, was near the marginal level. Individual wells produced from 5 to 35 bbl. of oil per day with total field production running about 40,000 bbl. monthly. Production in the field today is about 105,000 bbl. monthly.

Prior to the rework program at Big Foot field, which began in March 1952, most of the field's wells had dropped to the pumping state, and a large number of them had declined to the stripper stage. In most cases the reworked wells in the field are presently flowing evenly and with consistent pressure.

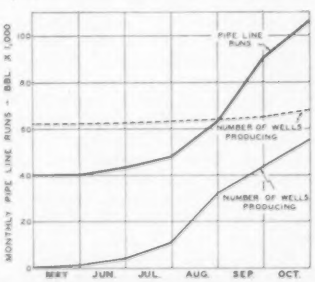


Fig. 3—Chart showing pipe-line runs, number of producing wells, and number of wells fractured by months since revival of field activity in May 1952.

Fig. 2—Place-fix map showing location of Frio County and Big Foot field.

As of November 1, 1952, there were 136 wells producing in the field compared to 124 in June 1952. The upward trend in the number of producing wells and pipe-line runs is especially abrupt since June. Table 1 shows production tests at intervals of 7, 30, 60, and 90 days after treatment. There was a 150 per cent increase in the field's production by the time 68 per cent of the wells had been fractured. Just about all of the old wells in the field have been treated now and new wells are being treated before they are put on production.

Reserves . . . Reserves at Big Foot field were estimated at 10 million barrels at the end of the initial development. This estimate has now been doubled as a result of additional development. However, whether the recovery per developed acre will be increased or the same amount of oil will just be produced faster is still a question.

Fig. 4—Mixer-type trailer flanked by two high-pressure pump trucks at a typical well being treated by the Stratafrac method. The treatment is in progress and the sand jel mixture is being injected into the formation. The job is being done without a workover rig on the well. Note the general simplicity of the piping arrangements used. This particular job took only a little more than 1½ hours.

The fracturing treatment provides a method of increasing the production from sandstone, chert, chat, conglomerate, limestone, and dolomite formations which are not adaptable to conventional acidizing.

Fracturing's function is:

1. To create new flow channels in the formation.
2. To open up flow channels in the formation.
3. To remove the acid-soluble constituents of the formation rock.
4. To remove paraffin or asphaltic deposits from the critical area.
5. To deposit a high-permeability sand in the opened flow channels.

Process . . . One type of fracturing process consists of squeezing a smooth, pumpable kerosine-acid jel which has sufficient body to carry sand in suspension into the formation.

A special round-grained sand, Ottawa sand, approximately 20 to 40 mesh, is used for the treatment. The proportion of the sand used in the jel varies with specific well requirements. In Big Foot field, 9,000 to 12,000 lb. of sand normally is used in a 3,000-gal. treatment which experimentation has proved most effective. One job in this field used 9,000 gal. of jel with 27,000 lb. of sand.

Most of the treatments at Big Foot have been made on wells completed in open hole, although some have been treated through perforations. The best results have been obtained from wells completed in open hole, the reason being that it is possible to use a greater concentration of sand in the jel and also the total volume of sand used may be greater.

Jel's power . . . The kerosine-acid jel contains chemical agents that provide dissolving power for limestone, dolomite, cement, silicates, and various clays or drilling-mud residues that may be present in the fractures. The spent jel and kerosine are returned to the well bore following treatment, without the use of a jel breaker. No shut-in time is required.

Well Treatment

Drilling to the top of the Olmos "B" sand, found at Big Foot between 3,200-3,500 ft., is done with a portable rotary. A tubing machine with a rotary table is used to tail in with oil in the hole using reverse circulation. It takes 3 days to drill a well, 72 hours' cement time, and 1 day to tail in and run tubing.

Equipment . . . Fracturing treatment normally takes about 4 hours. Two high-pressure pump trucks and one transport truck equipped with paddles to stir the liquid are used for a 3,000-gal. job.

The equipment is rigged in such a manner that the two pump trucks are connected to storage trucks of both fracturing fluid and oil. The well is loaded with oil and the operator may or may not have packer set.

Oil is pumped down the tubing with sufficient pressure to break down the formation. The oil enters the formation at 900 to 1,200 psi. Tubing pressure is gradually increased to check the packer, if set, and see that the tubing is free of any obstruction. The fracturing fluid is then started down the tubing at a slow rate with one pump. When the jel hits the formation the pressure jumps to 1,400 to 1,800 psi. The pumps are then speeded up and the liquid is forced into the formation at a high rate (5 to 6 bbl. per minute). Then the jel is flushed with 100 bbl. of oil to insure the carrying away of sand from the well bore. When flush oil hits the formation, the pressure drops back to 1,100 to 1,200 psi. This drop in pressure is not a pressure breakdown of the formation, but rather a drop due to change in viscosity causing a lower friction loss in the tubing. The pressure drop varies due to the grade of the oil flush.

The treatment of the well is then complete. The well is shut in and connections are removed. The operator then connects the well to the flow line connected to the test tank.

Numerous other structures along the Balcones fault line in areas whose fields appear near depletion give promise of additional larger recoveries. Rework and treatment by hydraulic formation fracturing method may revive many of these regions.

The results at Big Foot field indicate that a number of structures along the fault which have given up small recovery from tight sands may be turned into profitable commercial fields by the fracturing treatment.

TABLE 1—PRODUCTION DATA FOR A NUMBER OF WELLS IN BIG FOOT FIELD, SHOWING PERFORMANCE AFTER FRACTURE TREATMENT

			Before treatment*	7 Days after treatment		30 Days after treatment		60 Days after treatment		90 Days after treatment	
Well	Gallons treatment	Pounds sand	Bbl. oil per day	Bbl. oil per day	Choke size (in.)	Bbl. oil per day	Choke size (in.)	Bbl. oil per day	Choke size (in.)	Bbl. oil per day	Choke size (in.)
A	2,000	4,000	19	50	(‡)	33	(‡)	28	(‡)	29	(‡)
B	2,000	6,000	9	22	(‡)	16	(‡)	23	(‡)	20	(‡)
C	3,000	9,000	7	102	(†)	19	16/64	19	16/64	24	(‡)
D	2,000	4,000	11	49	(‡)	20	16/64	36	(‡)	..	.....
E	3,000	9,000	23	52	16/64	35	16/64	42	(‡)	..	.....
F	3,000	9,000	15	22	5/64	50	5/64	35	(†)	..	.....
G	3,000	9,000	16	30	(†)	32	11/64	24	11/64	..	.....
H	3,000	9,000	10	37	(†)	37	8/64	33	(†)	..	.....
I	3,000	9,000	14	65	(†)	64	9/64	41	12/64	..	.....
J	3,000	9,000	15	88	15/64	33	12/64	41	12/64	..	.....
K	3,000	9,000	12	128	15/64	42	12/64	31	16/64	..	.....
L	3,000	9,000	13	54	(†)	34	15/64	..	.....	..	.....
M	3,000	9,000	9	89	(†)	41	12/64	..	.....	..	.....

*All wells pumping prior to treatment. †Flowing—choke size not known. ‡Well still pumping after treatment.

NEW TECHNIQUE IN SUBSURFACE GEOLOGY . . .

The Percentage-of-Thinning Chart

by A. H. Wadsworth, Jr.

Percentage-of-thinning charts offer the subsurface geologist another aid in his studies of stratigraphic thickness change. Some of the advantages of this method of study are:

1 Worker is able to study the "thickness" behavior of an entire section and compare it to other entire sections in the same illustration.

2 Vertical perspective is added to augment the limited horizontal perspective of the single unit isopach map. One chart can illustrate much of what it takes several isopach maps to show.

3 The technique permits more accurate prediction of the level of anticipated horizons for coring points, correlation log points, or casing points.

4 One is able to readily date and correlate periods of thickness change. Thus the conception of time relationship, as well as space relationship, is introduced by this study to the solution of a stratigraphic problem. By correlating periods of thickness change on a regional scale, the exploration geologist has another tool to aid in his determination of whether certain isopach anomalies may be stratigraphic in origin or due to localized structural movement.

GEOLOGISTS have long utilized the advantages to be derived from careful studies of the changes of thickness in stratigraphic sections. Such observations as the variations in thickness of correlative sedimentary units have been graphically represented in several ways. By far the most common and useful method of such illustration is the isopach map. These maps have often suggested the existence of anomalous structural conditions where structural control itself was inadequate or inconclusive.

Isopach Maps

All thickness or isopach studies are based on the comparison of one correlative section with another. In preparing an isopach map, the thickness of each interval is plotted at its respective location and contours are drawn on the total thickness of the subject interval. Any difference in the thickness of the isopached interval between given sections is immediately apparent.

This paper was presented at the Regional Gulf Coast meeting of the Society of Exploration Geophysicists, Houston, May 1952, and appears in January 1953 bulletin of American Association of Petroleum Geologists.

Limitations . . . The isopach map, however, quantitatively represents this difference at only one interval selected from a total available stratigraphic section. No single isopach map can illustrate the thickness of units above or below the mapping interval. While it affords an excellent lateral view of the areal behavior of that one interval, the isopach map does not illustrate, in vertical prespective, the relationships between that unit and other measured intervals in the same or adjacent well sections.

Thus an important relationship, that of the **vertical** comparison of one interval with other intervals in the same section, is ignored.

A New Technique

A principal advantage of the percentage-of-thinning chart is that it does illustrate, in vertical perspective, the thickness relationships of all intervals at the same time in the same and in other well sections.

To illustrate this technique, let us assume a hypothetical case in the Tertiary beds of the Gulf Coast. The area under study covers 5,000 to 10,000 acres and four dry holes within the area are the key wells (Fig. 1).

The regional strike is east-west and the dip is to the south at approximately 150 ft. per mile. The stratigraphic section under observation is composed of alternating sands and shales and their various gradations, all of Tertiary age. For purposes of illustration, various horizons have been assigned hypothetical names.

Referring to Fig. 1, the Smith and Jones wells are strike wells located approximately 3 miles apart in an east-west direction and should normally be about structurally flat. The Brown well is 1 mile to the north of the Smith and should normally be some 150 ft. higher than the Smith. The Green is 2 miles to the southwest and should be about 150 to 200 ft. lower than the Smith. Yet it is known from a study of the electrical logs that the Smith and Jones wells are high and thin with respect to all others and they had good shows of oil that suggest the proximity of a nearby accumulation. As an aid in the interpretation of these logs, the construction of a percentage-of-thinning chart may disclose critical data.

Procedure

Assuming the Smith well to be the most anomalous, and the one to which

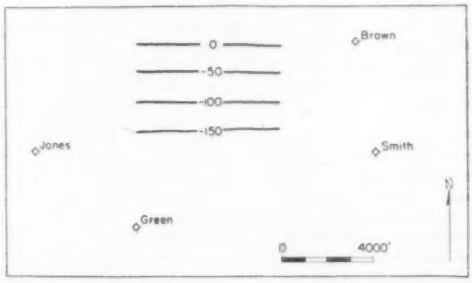


Fig. 1—Plat of hypothetical area illustrating position of wells and showing normal dip and strike.

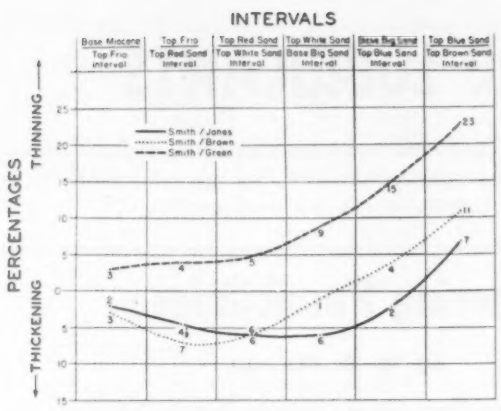


Fig. 2—Percentage-of-thinning chart.

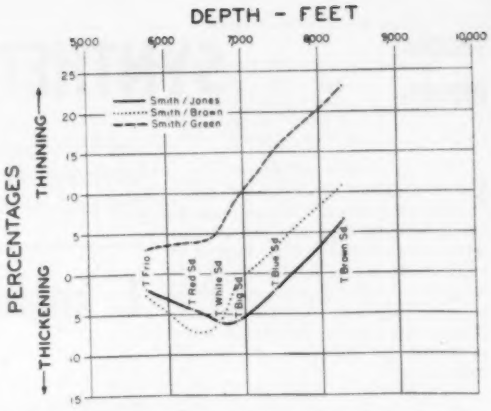


Fig. 3—Percentage-of-thinning chart. (Alernate representation.)

attention is first drawn, the worker chooses it as the "subject well" with the purpose of comparing it with all other wells one at a time. Thus the other wells become "compared wells."

Using the Smith well as the subject well it is found that the base Discorbis sand top Frio interval is 780 ft. In the Jones, the compared well, the same interval is 762 ft., or 18 ft. thinner. To reduce this number to percentage apply the formula $P = DT/CI$ where,

P = Percentage of thinning
DT = Difference in thickness of the interval in the subject well and in the compared well
CI = Compared interval, or that interval under study in the compared well

In this hypothetical case, $P = 18/762 = 2$ per cent thickening of the Smith over the Jones in the first interval. That percentage is plotted on a chart (solid curve, Fig. 2). The interval from the top Frio to the Red sand is 368 ft. in the Smith and 352 ft. in the Jones or a difference of 16 ft. Thus, $P = 16/352 = 4\frac{1}{2}$ per cent thickening of the Smith over the Jones in the second interval. This percentage is also plotted on the chart and so on down through as many intervals as the worker cares to plot. The shorter the intervals, the more detail and character the chart will have. However, in some stratigraphic sections, minor changes in thickness in short intervals may reflect only erratic curves on the chart.

From the above it has been seen that the Smith rate of thickening doubles from 2 per cent to $4\frac{1}{2}$ per cent over the Jones in the first two intervals, representing approximately 1,100 ft. of section. Referring to the chart (solid curve, Fig. 2) this trend is repeated in the third interval but is arrested in the fourth. In the fifth interval the Smith begins to recover over the Jones and in the sixth interval the Smith is 7 per cent thinner than the Jones in that same interval. The importance of the reversal of the trend of Smith thickening over the Jones at about the top White/base Big sand unit is immediately apparent.

Similar comparisons with other wells in the area are plotted on the same chart but on any one chart the subject well must remain the same and other wells are compared to it.

Referring to the dotted curve in Fig. 2, the Brown is now the compared well and it may be seen that the Smith thickens slightly in the first two intervals over the Brown. As the Brown is 1 mile updip to the north, this can be interpreted as normal downdip thickening. But in the third interval, the Smith reverses this trend and in the last interval it is 11 per cent thinner than that interval in the updip Brown well. Again the Smith exhibits anomalous character since, under normal conditions, it should have continued to thicken over the Brown with depth.

In comparison to the Green (dashed curve, Fig. 2) located 2 miles to the southwest of the Smith, the latter well shows normal updip thinning in the first three intervals but in the fourth, fifth, and sixth intervals this rate of thinning is abnormally accelerated.

Thus the Smith well has demonstrated anomalous thinning in three examples and the fact that the thinning becomes more clearly manifest below the third interval in all three cases is not coincidence.

To most geologists working in the Gulf Coast, this would be good evidence of deep structural buildup in the vicinity of the Smith well. An idea is gained as to the probable age of the latest uplift which in this case would be at a time after the deposition of the White sand and before the end of the deposition of the Red sand. It should be added that this technique may be successfully used in any other trend of any geologic age provided previous experience has shown that isopach studies are useful in that area.

Variation . . . An alternative method of illustration is shown in Fig. 3. In this case the vertical columns are represented by footage depths rather than by specific formation intervals. This has the advantage of allowing the geologist to project the curves beyond the penetrated depths so as to estimate with greater accuracy the level of anticipated horizons.

The value of such information is obvious for picking coring points, casing points, or correlation log points in a drilling well, particularly if the subject well is a wildcat. The procedure for calculating percentages is the same in both methods of illustration. In the latter case, it is still expedient to calculate the percentages between given formation units rather than between any certain footage depths.

THE AUTHOR

A. H. Wadsworth, Jr., is an independent geologist and oil operator at Bay City, Tex. He received B.S. and M.A. degrees in geology from University of Texas in 1941, and was employed as a subsurface geologist with Seaboard Oil Co. in Corpus Christi. Then he joined The Texas Co. in Midland as a geological scout. Later he became a member of the U. S. Geological Survey and spent several years doing geological work throughout the western states. In 1946 he became exploration geologist for American Smelting & Refining Co. in New Mexico, Arizona, and Southern California. In 1948 he returned to Texas and opened his own offices in Bay City.

JOURNAL REPORT:

SYNTHETIC LUBRICANTS*

Applications for these materials are expanding rapidly. These lubricants do not replace petroleum, but are tailor made to fit the jobs where petroleum oils are inadequate.

PRODUCTION of significant quantities of synthetic lubricants has resulted from the very stringent requirements for lubricants in a number of applications. These lubricants are not intended to replace petroleum oils in conventional usage; instead they are designed for special applications where petroleum products do not function well enough.

Each synthetic lubricant is tailor made to obtain certain optimum properties required by the job at hand.

Some of the uses for which these materials have been adapted are: (1) winter-grade crankcase oils, (2) turbo-engine oils, (3) lubricants for aviation instruments, and (4) lubrication of automatic weapons.

1. Engineering Possibilities

by W. A. Zisman†

THE synthetic liquids which have received greatest attention in the field of lubrication in the past 10 years are the aliphatic esters, the polyalkylene oxides, the silicones, the esters of phosphoric and silicic acids, and the highly fluorine-substituted hydrocarbons.

These tailor-made oils are homogeneous in the chemical sense, and all of their properties are readily predicted and controlled. Familiar types of chem-

*Adapted from papers presented at the National Fuels and Lubricants Meeting, Society of Automotive Engineers, Tulsa, November 6-7, 1952.

†Naval Research Laboratory, Washington.

TABLE 1—SOME SYNTHETIC AND REFERENCE OILS HAVING VISCOSITIES AROUND 10 CS. AT 210° F.

	Viscosity in cs. at °F.					A.S.T.M. evaporation Rate at 210° F.	Flash point C.O.C.	Pour point
Identification of oil—	—65	—40	0	100	210	% in 22 hr.	(°F.)	(°F.)
Grade 1120 petroleum oil (MIL-O-6082)	.....	.....	.....	369.0	24.9	<0.1	545	<20
Methylphenyl silicone (DC-550)	.....	>60,000	2,960	95.4	20.7	<0.1	>600	*—62
Polyethylene oil (SS-903)	.....	.....	25,000	219.0	20.1		385	—20
Grade 1060 petroleum oil (MIL-O-6082)	.....	.....	.....	121.0	12.4	<0.1	455	<0
Polyisopropylene oxide diester (Cal. Res. Corp.)	.....	.....	.....	70.8	12.6		465	—55
Polyisopropylene oxide (LB-300-X)	.....	.....	4,000	65.0	11.0	0.4	490	—40
Petroleum oil (AN-O-6a)	.....	4,000 (max.)	.....	.....	10.0 (min.)	27.0 (max.)	265 (min.)	<—70
Petroleum hydraulic oil (2-79B)	.....	7,500 (max.)	.....	38.0 (min.)	10.0 (min.)		225 (min.)	<—50
Methyl silicone (DC-200)	300	170	78	22.0	9.2	<0.1	520	—70
Polyisopropylene oxide (DLB-130-BX)	200,000	13,000	750	28.4	6.5		485	<—65
Fluorinated oil (Hooker-Fluorolube Std.)	.....	.....	.....	86.9	5.6		None	>0
Perfluorohydrocarbon (Dupont FCD-332)	.....	.....	.....	164.0	4.6	40.0	None	>0
Pentaerythritol tetracaproate	.....	4,690	452	20.0	4.4	<0.1	477	*—40

*Freezing point.

TABLE 2—SOME SYNTHETIC AND REFERENCE OILS HAVING VISCOSITIES AROUND 10 CS. AT 100° F.

	Viscosity in cs. at °F.					A.S.T.M. evaporation rate at 210° F.	Flash point C.O.C.	Pour point
Identification of oil—	—65	—40	0	100	210	% in 22 hr.	(°F.)	(°F.)
Bis(2-ethylhexyl) sebacate	8,600	1,410	187	12.6	3.3	0.1	450	—67
Bis(3,5,5-trimethylhexyl) glutarate	17,000	1,890	190	11.9	3.2	0.5		<—75
Polyisopropylene oxide (DLB-65-B)	17,000	1,950	190	11.8	3.2	...	380	<—65
Triamyl tricarballylate	.....	2,000	207	10.9	2.6	0.4		<—65
Bis(2-ethylhexyl) azelate	8,000	1,190	156	11.4	3.1	0.2	445	<—75
Synthetic oil (MIL-O-6085)	.....	2,000 (max.)	....	(13)	...	1.0 (max.)	365 (min.)	—70
Grade 1010 petroleum oil (MIL-O-6081)	(40,000)	3,000 (max.)	...	10.0 (min.)	...	Not required	265 (min.)	—70
Dihexyl pinate	6,480	1,135	149	10.3	2.8	0.3	385	<—75
2-Methyl-1,3-pentanediol dipelargonate	4,680	885	123	10.0	2.7	0.5		*0
Dipropyleneglycol dipelargonate	.....	.....	125	9.5	2.7	1.1		*—30
Polyisopropylene oxide diether (Cal. Res. Corp.)	7,700	1,000	120	9.4	2.9	...	370	<—65
Bis(2-ethylhexyl) pimelate	4,970	878	122	9.3	2.7	0.3		<—65
Bis(2-ethylhexyl) adipate	4,500	807	107	8.2	2.4	0.6	380	<—70
Polyisopropylene oxide (DLB-50-BX)	9,500	905	109	8.0	2.5	16.0	350	<—70
Methylsilicone (DC-200)	.....	60	28	7.9	3.5		325	—80
1,5-Pentanediol bis(2-ethylhexanoate)	5,600	920	117	7.8	2.2	0.8		—50
Perfluorohydrocarbon (Dupont FCD-330)	.....	14,500	297	6.3	1.3	100.0	None	—45
Petroleum hydraulic oil (MIL-O-5606)	.....	500 (max.)	....	(14)	...	Not required	200 (min.)	<—75
Synthetic gas turbine oil (MIL-L-7808)	13,000 (max.)	.....	.....	11.0 (min.)	3.0 (min.)	Not required	385 (min.)	<—75

(13 cs.) approximate viscosity at 100° F.; specification requires a minimum of 8 cs. at 130° F.
(14 cs.) approximate viscosity at 100° F.; specification requires a minimum of 10 cs. at 130° F.

*Freezing point.

TABLE 3—SOME SYNTHETIC AND REFERENCE OILS HAVING VISCOSITIES OF 1,500 CS. OR LESS AT —65° F.

Identification of oil—	Viscosity in cs. at °F.					A.S.T.M. evaporation rate at 210° F. % in 22 hr.	Flash point C.O.C. (°F.)	Pour point (°F.)
	—65	—40	0	100	210			
Special low-temperature lubricating oil (MIL-L-17353 BuOrd)	1,500 (max.)			5.0 (min.)		6.0 (max.)	300 (min.)	<—75
Tetraisooctyl silicate (Cal. Res. Corp.)	1,500	365	73.0	7.6	2.5	2.2		
Bis(2-methylpentyl) glutarate	1,390	279	48.1	5.2	1.7	4.1	385	<—65
1,5-Pentanediol (2-ethylbutyrate)	1,360	280	48.0	5.2	1.7	4.9		<—65
Dibutyl trimethyladipate	1,220	220	43.0	4.9	1.6	9.1	350	<—65
3-Methyl-1,5-pentanediol bis(2-methyl pentanoate)	924	203	40.0	4.8	1.7	3.9	355	<—65
Bis(2-methylbutyl) adipate	932	204	39.2	4.8	1.6	5.6	340	<—65
1,5-Pentanediol bis(2-methyl pentanoate)	719	170	35.0	4.5	1.6	4.8	340	<—65
Bis(amyl*) pimelate	671	180	41.0	5.4	1.9	2.6	375	<—75
Dibutyl (2-ethyl glutarate)	627	140	28.0	3.7	1.4	15.1	310	<—75

*"Oxo" process amyl alcohol.

ical addition agents can be used to improve them; and the development of compounded oils is generally simplier, since there are no undesired chemicals present to cause variations from one production batch to another in the response to antioxidants, viscosity-index improvers, detergents, oiliness additives, and wear preventives.

Lube oils . . . Especially useful are oils having the combined properties of low volatility at 210° F., low viscosity at 100° F., and low pour points (or freezing points). In Tables 1, 2, and 3 are found data for synthetic oils of interest on: the viscometric properties from 210° to —65° F., the A.S.T.M. evaporation rate at 210° F., the Cleveland open cup flash point, and the pour point (or the freezing point).

Although nearly all of the liquids in Table 1 have flash points well above 400° F. and evaporation rates of under 0.1 per cent, few have pour points much below 0° F. The silicones, the polyalkylene oxides, and the high-molecular-weight aliphatic esters are each becoming increasingly more useful as high-temperature oils because of their low volatilities, high flash points, and nonsludging characteristics.

A wide spread in the evaporation rates is exhibited by the liquids listed in Table 2, especially when the low-pour-point petroleum oils are compared with most of the synthetics. Many esters, doubly chain-stoppered polyalkylene oxides, and methyl silicones have evaporation ranges of from 0.1 to 0.5 per cent as compared to from 8 to 20 per cent or more for the petroleum products. Many of the esters have lower evaporation rates and higher flash points than the other liquids. Viscosities at —65° F. range from 5,000 cs. in some of the synthetics to 20,000 cs. in others.

When liquids are required in the viscosity range of Table 3, there are obvious advantages in employing synthetic oils. Thus Grade 1005 petroleum oil, which has a viscosity at 100° F. comparable to most of the liquids in Table 3, has a viscosity at —65° F. of around 2,000 cs., a flash point of 225° F. or less, and an evaporation rate of 20 per cent. In marked contrast, most of the synthetics in this group have viscosities at —65° F. of 700 to 1,500 cs., flash points of 340° to 385° F., and evaporation rates of 3 to 6 per cent.

The Case for Synthetic Lubricants in Winter Operation of Automatic Engines

by J. A. Miller* and H. F. Galindo*

AN excellent universal winter-grade crankcase oil can be formulated through the use of polypropylene glycol synthetic oils. Such an oil, in the 5W grade, has demonstrated satisfactory performance in Alaska and the colder areas of the United States and Canada. There are, of course, advantages for this type of oil even in milder climates because of quicker starts and the subsequent relief afforded to the battery as well as the improved fuel mileage obtained through the use of a lighter oil.

Satisfactory control of oil mileage and high-temperature engine protection using synthetic oil blends has been substantiated in field tests including those in military vehicles. These oils were formulated to permit starting under extreme winter temperatures and yet provide oil **mileage** comparable to that obtained with summer grade lubricants. This type of oil will also flow freely under extremely low temperature conditions and will provide adequate protection against wear, **rust,** and **engine deposits.**

By proper combinations of synthetics and mineral oils, conventional additives can be employed to give any degree of diesel-engine performance desired as defined by current service requirements. The synthetics, however, are still somewhat higher in cost than mineral oils, but their desirable properties can be utilized to good advan-

*California Research Corp., Richmond, Calif.

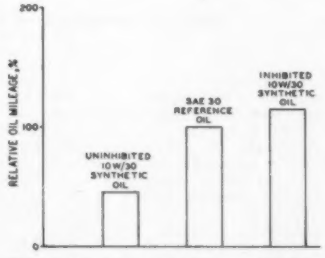


Fig. 1—Effect of inhibitors on oil-mileage characteristics of polypropylene-glycol-type synthetic oils.

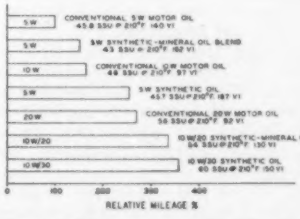


Fig. 2—Relative mileage of conventional and synthetic winter-grade crankcase oils.

TABLE 4—PROPERTIES OF SYNTHETIC OILS AND SYNTHETIC-MINERAL MOTOR OILS

	Synthetic oils			Mineral oil blending stocks		Synthetic-mineral motor oils		Conventional 5W
	A	B	C	1	2	A & 1	A & 2	motor oil
S.A.E. viscosity grade	5W	5W	10W/30			5W	10W/20	5W
Gravity, °A.P.I.	14.8	12.3	9.8	30.9	29.2	23.5	22.2	26.7
Flash point, °F.	390	390	420	290	420	325	410	315
Viscosity at (S.s.U. meas.):								
—30° F.	15,900	20,000				21,200		93,246
0° F.	2,100	3,000	11,700	1,570	55,000 ext.	2,980	10,800 ext.	4,897
100° F.	86.8	121	239	73.3	401	110	252	139
210° F.	39.8	45.7	60	36.7	57	43.2	54	45.7
Viscosity index	165	167	150	64	91	162	127	149
A.S.T.M. pour point, °F.	B-70	—60	—60	—40	5	B-70	—35	B-70
Stable pour point, °F. (undiluted)	B-70	—60	—60	—40	5	B-70	—25	—65
Conradson carbon, per cent	0	0	0	0	0	0.30	0.51	0.44
Ash, per cent	0	0	0	0	0	0.25	0.37	0.32
Per cent distilled at 480° F. 5 mm. Hg.*	32	<20	<5	94	6	69	16	More than 80
Oil miscibility temperature, °F.†	—15 to B-70	—35 to +25	+40 to +100					
PERFORMANCE CHARACTERISTICS								
Minimum pouring temperature	B-70	B-60	B-60			B-70	B-25	B-65
Minimum starting temperature	—30	—28	—15			—28	—15	—17
Oil mileage relative to mileage of S.A.E. 10W oil (100 v.i.)	103	156	216			92	204	61

*A.S.T.M. D-1160. †Temperature of phase separation—equal volumes of synthetic and various mineral oils.

tage. They may be considered excellent blending agents or "additives" to achieve the particular service performance required.

There has been some reluctance to use low viscosity winter grade lubricants because of poor experience with certain inadequate products in automotive engines. Unless the engine operator receives adequate high-temperature engine protection, the low-viscosity winter-grade lubricants will not receive the public acceptance they so justly deserve.

Fig. 1 illustrates the oil-consumption characteristics of the uninhibited synthetic oil as compared to properly inhibited synthetics in which the oil consumption characteristics are markedly improved by preventing oxidation.

Relative mileages of conventional winter grade oils are compared with those of polypropylene glycol synthetic oils and blends of synthetic and mineral oils in Fig. 2. In this illustration the mileage of a conventional 5W oil having a viscosity of 4.58 S.s.U. at 210° F. and a viscosity index of 140 was selected as 100 per cent. The mileages obtained with the various synthetic oils and mineral-oil blends are shown as a percentage of that mileage. Data on the synthetic-mineral oil blends were obtained in field tests including civilian and military vehicles.

Performance of Turbo-Engine Synthetic Oils

by A. B. Crampton,* W. W. Gleason,* W. E. Lifson,* and E. F. H. Pinnekamp*

NEW design turbojet and turboprop engines, featuring higher compression ratios and increased power output, have forced bearing and oil temperatures upward and increased the unit loads on the gears and bearings. In high-speed aircraft for which most of these engines are intended, oil cooling becomes a problem. In order to obtain sufficient heat transfer with the minimum size oil cooler, it is desired to reject the heat in the oil at the highest practical temperature.

Bearing temperatures in excess of 450° F. and "oil-in" temperatures above 225° F. are not uncommon. These factors subject the lubricant to extremely severe service with regard to high-temperature performance and load-handling ability, with no relaxation of the low temperature requirements. Lubricants for these advanced

*Esso Laboratories, Research Division, Standard Oil Development Co., Linden, N. J.

TABLE 5—QUALITY REQUIREMENTS FOR TURBO ENGINE OILS

Performance requirements	Desired oil property
1. Lubricate heavily loaded high-speed gears and bearings	Load-carrying capacity >45-100 per cent of Grade 1100 Mineral oil in high-speed gear rig
2. Low oil consumption at high temperature	Low volatility or evaporation rate (flash point >400° F. Nonfoaming. Nondestructive to synthetic seals
3. Nondeposit forming, noncorrosive	Thermally and oxidation stable and noncorrosive at 350°-450° F.
4. Pumpable at low temperature	Viscosity at minimum starting temperature <5,000-20,000 cs.

TABLE 6—PROPERTIES OF ESTER TYPE SYNTHETIC OILS

	Synthetic oils			Mineral oils	
Property—	"A"	"B"	"C"	1010 jet engine oil	1100 piston engine oil
Viscosity at 210° F., cs.	7.9	3.6	3.1	2.5	20.5
Gear scuff load, per cent of Grade 1100 oil	105	60	45	<15	100
Flash point, °F.	450	430	400	295	485
Relative evaporation rate at 400° F., per cent of Grade 1010	2	3	10	100	1
Oxidation-corrosion stability at 347° F.	(*)	(*)	(*)	(†)	(†)
Temperature range for 5,000 to 20,000 cs. viscosity, °F.	—25 to —45	—55 to —70	—60 to —75	—45 to —60	+5 to +30

*Stable, noncorrosive. †Unstable, corrosive.

design engines must exhibit an outstanding combination of physical and chemical properties. Experience to date with these engines is not extensive enough to define the desired lubricant properties precisely. However, sufficient information is available to give a fair approximation of the most important lubricant quality requirements. These are summarized in Table 5.

Properties of ester oils . . . As shown in Table 6, all ester oils exhibit better load-carrying capacity than the Grade 1100 reference oil. The outstanding gear and bearing lubrication shown by these oils is due in part to the use of a unique high-viscosity ester-type component having good load-carrying capacity combined with low pour point, excellent viscosity-temperature properties, and good high-temperature oxidation corrosion stability.

Oil-consumption characteristics of all three synthetic oils, as measured by evaporation rate or flash point, are good, indicating a ten to fiftyfold improvement over the conventional light mineral oil.

By incorporation of a suitable inhibitor, these ester-type products all show much better high-temperature oxidation-corrosion stability than the mineral oils they are intended to replace.

The synthetic oils show much better low-temperature properties than the mineral oils of approximately the same viscosity at 210° F.

The performance of ester oils in turbojets is shown in Table 7. The bearing and accessory gear lubrication with three synthetic oils was adequate in all engines. Grade 1010 mineral oil, on the other hand, permitted some gear scuffing and bearing wear in the most critical engines.

All three synthetics gave low oil consumption, due to their low volatility, while oil consumption for Grade 1010 was excessive in critical engines due to high volatility and/or excessive foaming.

Typical properties of ester-type synthetic oils are shown in Table 8.

TABLE 7—PERFORMANCE OF LUBRICANTS IN ADVANCED DESIGN TURBOJET ENGINES

Lubricant	Mineral oil	Ester type synthetic oil		
	Grade 1010	"A"	"B"	"C"
Viscosity at 210° F., cs.	2.5	7.9	3.6	3.1
Gear and bearing lubrication	Some scuffing and wear	Excellent	Good	Acceptable
Oil consumption	High to excessive	Low	Low	Low
Deposits and corrosion	Medium to heavy deposits. No corrosion	Light to medium deposits. No corrosion	Light to medium deposits. No corrosion	Light to medium deposits. No corrosion
Low temperature pumpability limit	—40° to —65° F.	—40° F.	—50° to <—65° F.	.....

TABLE 8—TYPICAL PROPERTIES OF ESTER TYPE SYNTHETIC OILS

	Oil "A"	Oil "B"	Oil "C"
Viscosity, cs.:			
210° F.	7.9	3.6	3.1
100° F.	38.0	14.2	11.6
—40° F.	12,500	1,920	1,500
—65° F.	(*)	13,000	10,000
Pour point, °F.	—65	<—75	<—75
Low-temperature stability (72 hours at —65° F.)	(†)	(‡)	(‡)
Specific gravity, 60°/60° F.	0.964	0.929	0.943
Flash point, °F.	450	430	400
Evaporation rate at 400° F., S.O.D. test, per cent per hour	0.3	0.5	1.7
Vapor pressure at 400° F., mm. Hg	0.5	0.9	2.8
Vapor pressure at 300° F., mm. Hg	<0.1	0.1	0.2
Neutralization number (A.S.T.M. D-664)	0.2	0.2	0.2
Precipitation number	1.0	Zero	Zero
Oxidation-corrosion stability, 72 hr. at 347° F.			
Strip weight change, mg. per sq. cm.:			
Copper	—0.30	—0.20	—0.20
Steel	+0.02	—0.02	—0.01
Aluminum	+0.04	—0.06	+0.02
Magnesium	+0.05	—0.02	+0.03
Neut. No. increase (D-664)	1.2	1.5	1.3
Viscosity increase at 100° F., per cent	12	6	5
Lead corrosion, 1 hr. at 325° F., mg. wt. loss	30	30	20
Silver corrosion, 17 hr. at 325° F., mg. wt. change	+0.1	+0.5	+0.5
Copper strip corrosion, 3 hr. at 212° F., strip rating	J6	J7	J5
Four ball e.p. test:			
Seizure load, kg.	75	85	75
Weld load, kg.	140	130	130
High-speed gear test scuffing load, per cent of Grade 1100 mineral oil	105	60	45
Rubber swell, per cent, Type "H" rubber, 1 week at 158° F.	26	24	39
Autogenous ignition temperature in O_2, °F. (modified Moore method)	490	485	475
Surface tension, dynes per cm. (air)	34.4	33.3	32.3

*Too high to measure. †Gels. ‡No gel or separation.

BOOKS

CONDUCTIMETRIC ANALYSIS AT RADIO FREQUENCY. By G. G. Blake. Published by Chemical Publishing Co., 212 Fifth Avenue, New York 10. 109 pp. $2.75.

This book describes the author's new technique and methods of conductimetric analysis or amperometric titration. It also gives the details for setting up reliable apparatus for carrying out analyses and titrations. Radio-frequency methods are described in detail by which a large or small quantity of any reagent can be compounded rapidly to match in concentration a small quantity of any standard solution without using a chemical balance.

THERMODYNAMIC PROPERTIES OF NITROGEN. By O. T. Bloomer and K. N. Rao. Published by American Gas Association. 28 pp. $3.50.

This is Research Bulletin No. 18 of the Institute of Gas Technology and is the second growing out of Research Project NB-1, "A Study of the Physical and Physico-Chemical Properties of the Methane-Nitrogen and Methane-Ethane Systems," by Dr. D. T. MacRoberts, of United Gas Pipeline Co., chairman. The bulletin gives the latest data on the thermodynamic properties of nitrogen over the range —320° F. to +500° F. at pressures of from 10 to 1,500 psia. Thus adequate data are now available to the engineer for use in designating nitrogen separator plants or for other similar low-temperature work.

Fig. 1—World Mercator projection showing location of some of the wide shelves of the world. (See Table 1.)

TABLE 1—SOME WIDE SHELVES OF THE WORLD
(After Shepard and others)

Shelf No., on map	General location and depth in fathoms—	Dimensions in miles
1	Arafura Sea, less than 50	750
2	Sunda Sea, less than 30	300
3	Barents Sea, 100-200	750
4	North Sea, 100	70
5	Siberian Shelf, flat	400
6	Yellow Sea, 50	750
7	Bering Sea, 50	500
8	Beaufort Sea, deep*	Narrow*
9	Hudson Bay, 50-100	600-800
10	Gulf of Mexico, adjoining North America, 35-100	150-175
11	Gulf of Maracaibo, 9-20	60
12	Pacific Coast, southern California, 50-100	1-10
13	Caspian Sea (Volga delta), very shallow	200-600
14	Black Sea, 50	300-700
15	Orinoco delta area, shoals	70
16	Amazon delta area, 10-44	200
17	Rio Plata estuary, 3-10	260
18	Bahia Blanca southward, 50	200-350

*Relatively so.

NEXT MAJOR PROVINCE?

Geologic and Engineering Aspects of CONTINENTAL SHELVES

by J. C. Miller

Here is some interesting speculation on ways and means of realizing additional production from the world's shelf areas, if and when this potentially enormous reserve is more actively exploited.

ON the assumption that most continental shelves are the seaward extensions of the continents and that important sedimentary basins embrace both, it follows that such shelf areas may be regarded as favorable prospecting territory.

If one leaves out of consideration for the moment lands within a few miles of shore, it is evident that there still is a large extent of relatively shallow water on the continental shelves in this country and in foreign countries that might be regarded as favorable territory for prospecting submerged mineral deposits. In some climates the shelf may be more suitable for drilling operations than the difficult terrain of the interior.

At present, buoyant drilling platforms appear more adaptable to exploratory operations on the shelf than to oil-field development, and informed opinion regarding offshore drilling is that operations will be confined to depths of 60 ft. of water or less from elevated platforms on piling.

It may be assumed that technologic improvements in exploration methods and equipment may permit longer or deeper directional holes and probably drilling from adits or tunnels and inclined or vertical shafts beneath the shelf surface in water depths of 40 to 200 ft., that is, at depths below the zone of breakers, destructive wave action, and erosion, when economic conditions warrant.

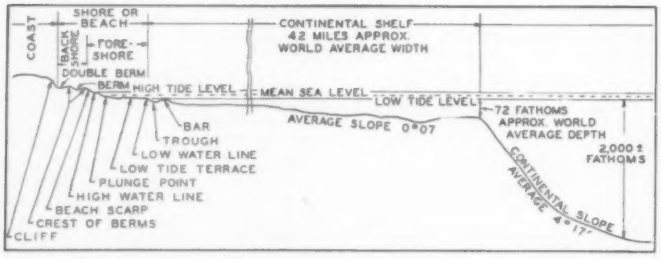


Fig. 2—Hypothetical profile showing terms generally used in describing some features of beaches and the continental shelf. (After Shepard.)

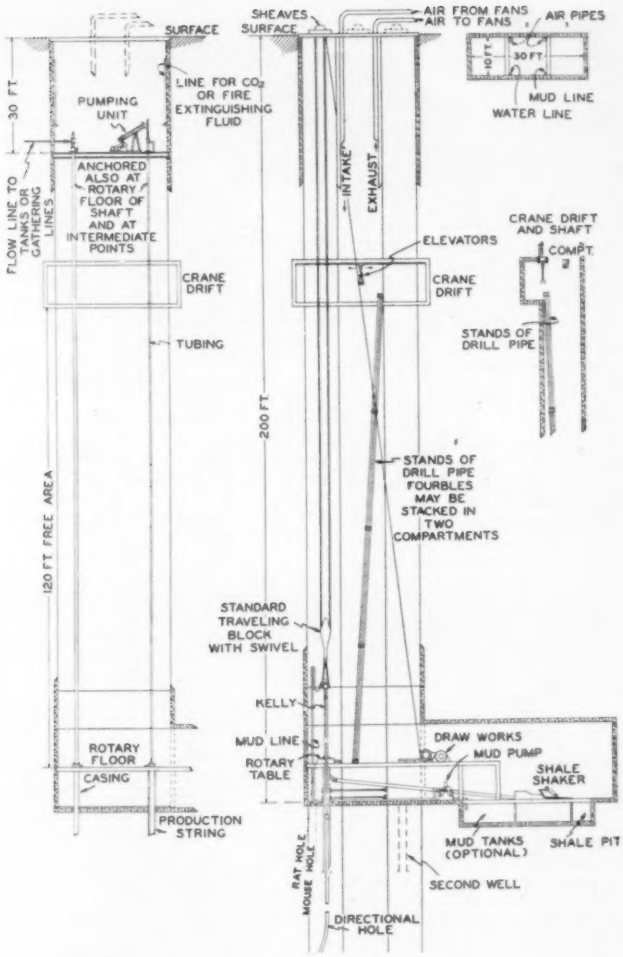


Fig. 3—Attempt to show the possibility of using standard rotary equipment in a vertical three-compartment shaft, roughly 10 by 30 ft. inside, supplied with water, air intake, and exhaust lines. The size of the air pipe or pipes shown would depend on the length of the shaft, friction losses, velocity, and the amount of air to be delivered to the working areas.

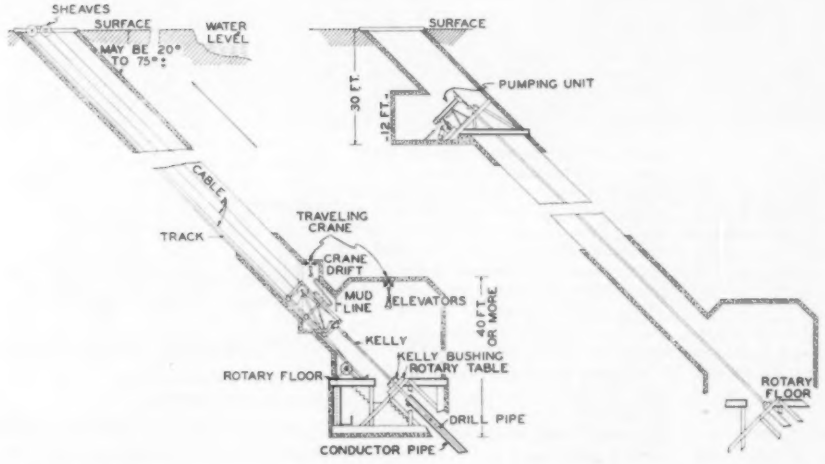


Fig. 4—In an inclined shaft it is proposed to modify the hoisting equipment customarily used. Instead of the usual traveling block, a U-shaped skip or cage on tracks is suggested to cradle the swivel. The equipment of this skip with electrically or manually operated slips or clamps for handling casing and drill pipe is visualized.

THE AUTHOR

J. C. Miller is regional geologist, Mineral Classification Branch, of the United States Geological Survey, Los Angeles. His work has to do with oil, gas, coal, and other mineral examinations in addition to dam-site investigations. He was educated at Missouri School of Mines, with B.S. and E.M. degrees, and George Washington University, with M.A. and Ph.D. degrees. Following 8 years as petroleum geologist and petroleum engineer in private industry in the Mid-Continent and Rockies, he spent 6 years as petroleum engineer with the U. S. Bureau of Mines and U.S.G.S., and since 1930 has been a geologist with U.S.G.S.

These illustrations show hypothetical adaptation of rotary equipment in vertical or inclined shafts to drilling and development of offshore oil and gas fields. The vertical shaft on shore is proposed for drilling directional wells to be bottomed less than 5,000 ft. and probably not more than 10,000 ft. offshore; the incline is intended for drilling wells either vertical or directional greater than 5,000 ft. offshore, whether the incline is or is not terminated by vertical drilling shafts or compartments.

It seems probable that shafts might be employed where:

1. Derrick sites are unavailable for slant holes to develop offshore leases.
2. The drift angle might be too large for the length of hole necessary to reach the objective sand in a leasehold far from the shore location.
3. The depth of water is too great for stable, permanent structures offshore.
4. Well equipment is a hazard to navigation or to national defense.

Origin of Continental Shelves

The common occurrence of a shelf edge between the isobath of 70 and 200 m. invites speculation concerning its origin, but there are probably no simple explanations for the origin of these shelves. Of the various views held regarding the origin of the continental shelf or terrace, at least three seem worthy of mention as follows:

1. The terrace is largely the result of marine and subaerial erosion of the continental mass.

2. The terrace is formed principally by subaerial denudation, followed by drowning, without effective marine erosion.

3. The terrace is formed by outbuilding of the continent and upbuilding of sediments on a subsiding foundation.

The plane of balance or equilibrium between aggradation and erosion occurs at a depth of 60 to 70 m., according to some authorities, and this is regarded as the limiting depth at which storm waves aided only by normal tidal currents can agitate the bottom deposits. However, Daly[1] states, "At the present time it appears that the outer half of each broad continental shelf is too deep to represent a profile in equilibrium with the forces responsible for the building of the continental terrace.

The present shelf may be the aggregate result of erosion, transportation, deposition, tectonic movement, and volcanic activity as modified by waves and currents. Where strong oceanic currents scour the coast, the shelf may be narrow or missing.

Continental shelves the world over vary greatly in width, and, in general, soundings show that the broader the continental shelf the broader the adjoining coastal plain, the reverse being true for the narrow shelf. For all parts of the world the continental shelf has an average width of 42 miles and an average depth of 72 fathoms at the shelf margin.[2] Table 1 lists some of the wider shelves of the world, many of which may be within the seaward extension of sedimentary basins.

Much of the Atlantic shelf of the United States is 25 to 100 miles wide, ranging in depth from 50 fathoms east of Chesapeake Bay to 80 fathoms north of the Hudson River. That of the Gulf of Mexico varies from 28 to 175 miles in width and from 35 to 100 fathoms in depth.

Along the east coast of South America the shelf attains a width of 350 miles. The greatest widths occur mainly at the deltas of large rivers and at the estuaries. Along the west coast of South America the shelf is mostly narrow and very irregular in depth and width due in part to glaciation. In places it attains a width of 30 to 40 miles and depths largely less than 100 fathoms.

The shelf along the Pacific side of the United States is on the average narrower than on the east coast. The shelves surrounding the offshore islands are also narrow. North of Point Conception the shelf width decreases rather continuously toward Point Sur, but south of Point Conception it is wider. It widens again to 20 miles off San Francisco, then narrows to the north and averages about 10 miles in width as far north as the Oregon line. Along the Oregon and Washington coasts the shelf is wider, averaging a little over 20 miles.

Insular shelves . . . The platforms bordering oceanic islands have been designated insular shelves and these shelves are predominantly narrow. However, a few of the coral islands have broad shelves and some of the submerged coral banks in the Southwest Pacific and in the Indian Ocean are said to be 100 miles or more in width. The shelves around the central group of the Hawaiian Islands extend outward to 300 fathoms, although most of the narrow shelves adjacent to the islands terminate at the 50-fathom depth. Many islands are lacking in appreciable shelves and many coral islands are reported to have no shelves. The islands off the coast of southern California have generally narrow shelves.

Other shelves . . . Shelves in deep landlocked bodies of water form a third type. Shepard states that no shelf is evident in the Great Lakes, and the shelf around the Caspian Sea is very shallow and extensive off the Volga River delta. The Black Sea also has a narrow shelf around most of its margin, although near Odessa and the delta of the Danube the shelf has a maximum width of 120 miles and a depth less than 50 fathoms. The remainder of this shelf is 5 to 10 miles in width. As indicated previously, shelves of this character might be designated intracontinental shelves to distinguish them from the shelves adjacent to the ocean or open sea. Other than those cited, it is doubtful if such shelves would be given a great deal of international consideration inasmuch as large salt and fresh-water lakes and inland seas are fewer in number and usually well within the boundaries of a sovereign state or nation.

Ordinary mining methods were applied to the production of petroleum in ancient times. The recovery of petroleum from shafts or tunnels has been accomplished in this country, in Europe, Russia, Burma, Japan, and elsewhere by means of gravity drainage, by actual mining operations, or through drill holes draining into shafts.

Wallace E. Pratt has suggested the use of tunnels, galleries, or shafts in connection with exploration of oil on the continental shelf and states that:

". . . we might discover that the most practical approach to great stores of petroleum in the sediments of the continental shelves, once we have proved their existence, is not through the waters of the turbulent sea above them, but along the sea floor beneath these waters; not through a multitude of wells drilled through ocean water . . . but through a few galleries constructed upon or excavated into the ocean floor from adjacent land."

When the offshore distance to a prospective oil and gas structure on the continental shelf is measured in miles or tens of miles, however, the cost of rock tunneling would probably be prohibitive, according to available figures. Unless cheaper sectional tunnel tubes of sufficient size to transport men and equipment can be designed for use on or in the surface of the shelf, expensive buoyant or semibuoyant installations may be required if favorable offshore structures are to be tested at all.

The problem of repair and maintenance of wells in such locations probably would be more difficult to solve than their drilling, and in the absence of flowing wells, the possibility of firmly anchored and enclosed remote-control submerged pumps connected to submarine pipe lines might be investigated where a stationary or a buoyant platform is not feasible.

For drilling prospective fields within approximately 1 or 2 miles of shore, inclined or vertical shafts, tunnels, or adits sunk either below or in part of the shelf surface at depths not subject to destructive action of storm waves, might prove satisfactory. In certain cases an inclined shaft may terminate in a drift or room from which a number of vertical shafts are sunk. Some new methods or modifications of present methods of rotary drilling and of handling casing may have to be devised, but the current techniques of drilling directional holes would probably suffice.

Exploration Methods

Concern regarding the adequacy of our petroleum reserves eventually may lead to extensive drilling of our continental shelves. The exploration and development of the tidelands and offshore areas is a costly and difficult undertaking and a number of methods have been proposed.

Drilling platforms . . . The design and maintenance of drilling platforms are

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BIW PX-350 Stripper Type Tubing Head

The BIW PX-350 is an efficient and economical method for suspending tubing on completion and, later on, for working over the well or putting it on pump. The Tubing Head can be converted readily into a threaded hanger suspension-type tubing head, a slip suspension-type pumping head, or it can be equipped with a gas lift hanger.

Figure 2 shows the construction of the heavy duty Neoprene stripper. This stripper permits running and pulling tubing without the use of additional blowout preventer equipment. The one piece rubber packoff is molded into a steel spider ring to prevent stripper motion while the tubing is being raised or lowered. Tubing collars are passed readily; well pressure is sealed in effectively.

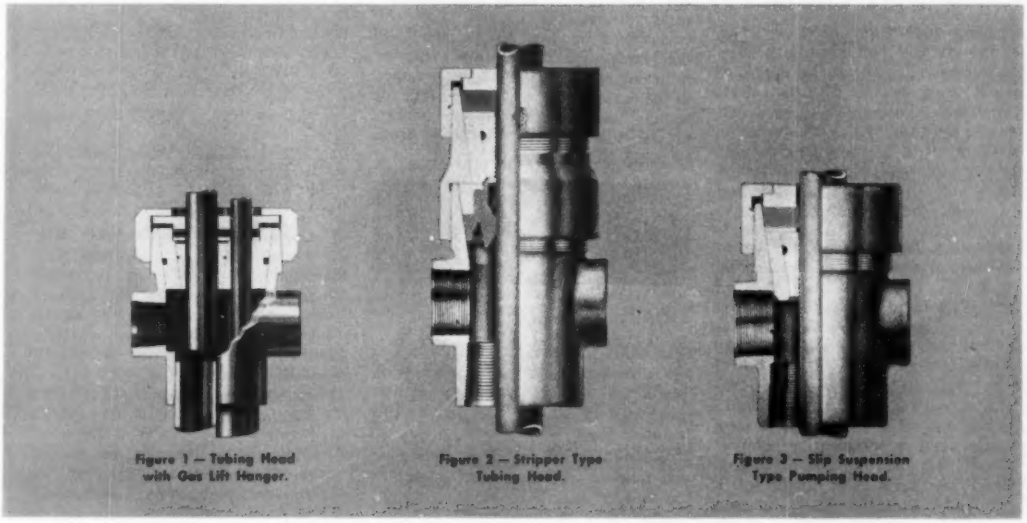

Figure 1 — Tubing Head with Gas Lift Hanger.

Figure 2 — Stripper Type Tubing Head.

Figure 3 — Slip Suspension Type Pumping Head.

The head, as shown in Figure 1, can be converted to a gas lift head by removing the stuffing box assembly, slips, slip bushing, slip bowl, and stripper assembly, and substituting a gas lift hanger. The gas lift hanger utilizes slips for suspension of the gas pipe and is threaded for the tubing connection.

The ease of conversion to an efficient pumping head is shown in Figure 3. The stripper assembly and slip bowl are removed. The slip assembly is seated in the body of the head, and the stuffing box is made up on the body of the head instead of on the slip bowl.

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Warehouses in Beaumont and Odessa

influenced by oceanographic and meteorologic factors.

To date there are two general types of marine-drilling platforms, namely: (1) fixed, and (2) fixed and buoyant. The fixed typed is adaptable to use close inshore and may be constructed of sheet piling carried well above the level of storm waves to form an artificial island; or the platform may be supported on piles of wood, concrete, or steel. The pounding of sea waves against a solid obstruction tends to scour out the bottom at the base of the cofferdam or sheet piles and a part of the breakers will cascade upwards and tend to flood the platform.

The second type is a combination of a fixed and floating platform on which the entire drilling deck is either partly supported by piling and partly by pontoons, or by piling carrying the essential drilling equipment while much of the accessory equipment is carried on a nearby barge or drilling tender which may be as much as 250 ft. in length with cargo requirements in excess of 2,000 tons. This combination type permits removal of floating equipment in case of severe storms.

Drilling barges supported by partially submerged pontoons have been used successfully where the depth of water is commensurate with their draft by first placing a compacted shell mat over the area on which the barge is placed. Such installations are satisfactory close to shore where the water is shallow and wave action is minimized by protecting reefs or bars.

Recovery by shafts . . . The problem of maintenance of drilling and producing equipment in the open sea far from shore is admittedly a difficult one which has aroused speculation concerning ways and means of circumventing the destructive action of wind and waves. Several modifications of current practice are proposed and variations in the usual drilling and producing methods may be postulated.

If it is granted that the most economical maximum drift angle for a directionally drilled hole is between 15° and 45° from the vertical, rather than 60° to 80°, then such inclined shafts usually could be sunk at angles of 40° to 75° from the horizontal and in extreme cases a smaller angle of 20° to 40° from the horizontal may be attempted. These slopes are based on the assumption that it might be necessary and desirable to maintain a constant angle from the point of origin to the objective, conforming more or less to the inclination of the shaft, and that the angle of penetration would be sufficient to test the entire thickness of oil sand if required. It is recognized, however, that a constant angle in drilling is not always mandatory and that mechanical considerations dictate more or less the usual increment in deviation from vertical of 2° 30′ per 100 ft. of hole drilled in order to provide the uniform rate of angular increase along a smooth arc until the maximum drift is attained.

Size and design . . . It seems probable that the length or depth of inclined or vertical shafts designed for penetration of objective sands near shore need not be much in excess of the height of a derrick, that is, 200 ft. or less. If longer stands of drill pipe are to be handled in a vertical shaft the depth might be increased to 500 ft. and space for drill pipe within the shaft might be provided.

Underground space or rooms adjacent to the shaft for tools, pumping, cementing, and drilling equipment, and mud fluid would appear necessary to efficient operation, provided such pumping operations cannot be conducted on the surface. Connections for flowing or pumping a producing well could be housed within or adjacent to the shaft. Of these requirements for rotary drilling, perhaps first consideration should be given to the sump and the storage for mud fluids. Whether returning mud fluid should be pumped to the surface for removal of sand, for settling, aeration, and reconditioning, or the fluid should be pumped from and into sumps, settling or mixing tanks underground near the level of the rotary table is a problem to be considered along with the added expense of air conditioning and construction of these underground facilities.

Some of this auxiliary equipment and various possible adaptations of rotary drilling practice are illustrated in Figs. 3 and 4. Hypothetical examples of rotary equipment in vertical and inclined shafts are shown in more or less detail. It seems probable that standard rotary equipment could be adapted to drilling in inclined shafts with some changes in design of certain parts, principally the traveling block. There is no doubt that drilling in an inclined shaft would require new methods of handling casing and equipment, and that drilling under such conditions might be slower.

In any event, it appears that the cost of a shaft of moderate proportions (200 to 1,000 ft. in length) should compare favorably with permanent surface installations resulting from discoveries made by using floating equipment, but a shaft of considerable length, say, 5 to 10 miles, is a hazardous and expensive operation.

References

1. Daly, R. A., The Floor of the Ocean, 1942, p. 100.
2. Shepard, E. P., Submarine Geology, 1948, p. 143.

Manifold—What Kind?

THE Oil and Gas Journal's equipment-conscious photographer, R .B. Ward, asks that you correctly identify the nature of service provided by this manifold.

Which kind of manifold service do you think it is? Place your answer in the square below.

Look at page 83 and see if you have answered correctly.

- ☐ Condensate water drainoffs from products tanks in tank farm.
- ☐ Chemical distribution manifold, conveying fire-extinguishing liquids to strategic points at outlying installations.
- ☐ Production header for flowing oil wells.
- ☐ Manifold for incoming flow from water-supply wells, at new water-flooding project in West Texas.
- ☐ Low-pressure incoming gas header, serving battery of tanks holding volatile hydrocarbon liquids.

Prolific Limestone Reef Production

(Continued from page 69)

from original pressure of 3,650 psig. at datum to 3,257 psig. for a total decline of 393 psi.

Fig. 3 illustrates the performance of the reservoir pressure versus total field cumulative oil production. At the April 1, 1951, survey date, the pressure had declined appreciably but not at an alarming rate, as 5,911 bbl. of oil had been produced per pound per square inch of pressure decline since withdrawals began. Performance to this date had been very similar to other water-drive-type reservoirs and it had been determined by material-balance calculations that an active water drive was present in the reservoir.

On April 1, 1951, and in accordance with a special request made by all operators to the Railroad Commission, the top field allowable was voluntarily reduced on a temporary basis from 275 to 150 bbl. per well per producing day in order to study the effects on reservoir performance.

On July 1, 1951, 3 months after the allowable reduction, the arithmetic average reservoir pressure was 3,263 psig. which reflected an increase of 12 psi. over the April 1, 1951, result of 3,251 psig. During this quarter all operators produced 478,158 bbl. of oil which placed total cumulative withdrawals at 2,801,328 bbl.

On October 1, 1951, 6 months after the reduction, the arithmetic average pressure was 3,249 psig. which closely compared to the pressure of 6 months previously. Withdrawals of oil by all operators for this period were 496,315 bbl. and for the 6-month period were 974,453 bbl. Therefore, since withdrawals were reduced, approximately 1 million barrels of oil was produced from this reservoir without a loss in bottom-hole pressure. This occurrence was in direct opposition to the established trend of bottom-hole-pressure decline and must be attributed to the effectiveness of the field water drive.

From October 1, 1951, to April 1, 1952, all operators produced 979,259 bbl. of oil which was responsible for a decline in average pressure to 3,219 psig., a net decline of 30 psi. in 6 months and a drop of 32 psi. for the last year, during which time approximately 2 million barrels of oil was produced. This yields a figure of 61,000 bbl. of oil per pound drop as compared to 5,900 bbl. per pound before April 1, 1951.

It should be pointed out that during the last 6 months of operation, October 1951 to April 1952, water production increased somewhat over previous periods and the reservoir performance can only be effectively interpreted by considering total field liquid withdrawals. When consideration is given to the increased water withdrawals it is evident that a considerable part of the pressure decline was attributable to water production.

Theoretically, it appears that the pressure of this reservoir could be maintained at its present value if water withdrawals could be maintained at a minimum value; however, this is impractical from an operational standpoint.

As of October 1, 1952, total withdrawals of oil from this field were at 5.1 million barrels with a resultant loss in bottom-hole-pressure of approximately 425 psi. The reservoir pressure presently is 1,200 psi. above the saturation pressure of the reservoir oil and it appears very probable that this saturation pressure will never be reached due to the extremely active water drive.

Acknowledgments

The author wishes to express his appreciation to Seaboard Oil Co. of Delaware and Pan American Production Co. for permission to publish this article.

BOOKS

PLANT LOCATION. By Leonard C. Yaseen. Published by Business Reports, Inc., 225 West Thirty-fourth Street, New York 1. 195 pp. $12.50.

Here is an authoritative and practical presentation of the factors influencing scientific location of new plant facilities in an era in which there are rapid population shifts, growths in numbers, changes in age brackets, shifts in location and skills. The author shows why and how to make a study of raw-materials sources, the manner in which they are processed, the people and skills needed to do that job, and the buying habits and locational concentration of the people who use the product. Against this picture prospective locations are evaluated in terms of costs for materials, labor, utilities, taxes, and distribution to the market. The objective is the scientific determination of that one best community which offers the greatest competitive advantage for a specific manufacturing operation.

SOME OBSERVATIONS ON EXECUTIVE RETIREMENT. By Harold R. Hall. Published by Harvard Business School, Division of Research, Soldiers Field, Boston 53. 298 pp. $3.75.

This study is based largely on interviews with business administrators and retired executives. It reports their experiences from both the individual and the administrative points of view. It also reports the views of professional men looking at some aspects of the retirement problem from the outside. The initial chapters stress that the success of retirement for the individual executive depends on both financial and activity preparation. A summary of the past history and present status of company retirement plans is presented, followed by a treatment of the trends retirement plans seem to be following. One chapter deals with the controversial questions of "When should an executive be retired?" and "Should chronological age or 'effective' age be determinant?" The problems in using and determining retirement age are raised and treated from the management point of view.

ADDITIVES USED IN OILS AND GREASES. Compiled, edited, and published by Petroleum Educational Institute, 9020 Melrose Avenue, Los Angeles 46. 79 pp. $1.50.

This is another in a series of booklets which comprise an elementary course of study in the fundamentals and application of petroleum fuels and lubricants. The text is intended and specially prepared for nontechnical individuals engaged in the servicing and marketing of these products. Simplicity was therefore considered the keynote throughout the compiling of both the text and illustrations. The text is devoted to a study of the principal additives employed in the treatment of lubricating oils, greases, and gear compounds used in the automotive and industrial fields.

BOLIVAR, NEW YORK—PIONEER OIL TOWN. By John P. Herrick. Published by Ward Ritchie Press, Los Angeles. 150 pp. $3.

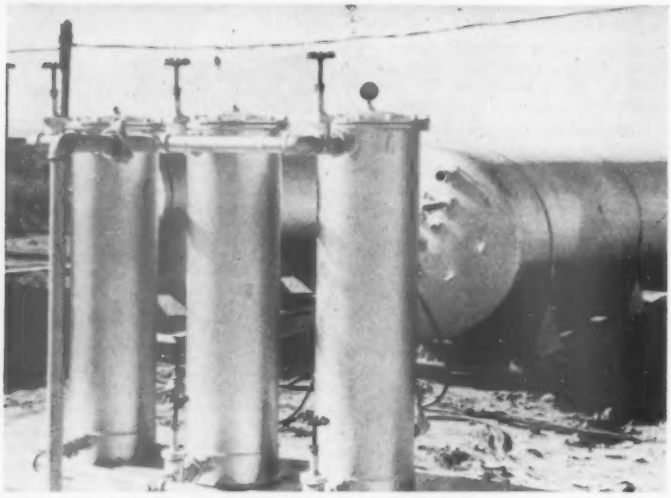
This is the story of a village which was suddenly transformed by the discovery of oil from a peaceful rural settlement into a boisterous oil-boom town. This was in 1881. Then, with the fairly rapid decline in oil production it lapsed once more into its former somnolence, until the early 1920's when secondary recovery of oil brought lasting prosperity. In addition to the general historical background, the book contains sharply pictorial and complete histories of local institutions, businesses, and professions.

PRINCIPLES OF INVERTEBRATE PALEONTOLOGY. By Robert R. Shrock and William H. Twenhofel. Published by McGraw-Hill Book Co., 330 West Forty-Second Street, New York 36. 816 pp. $12.

This thorough revision for the second edition of this work results in a completely new book. It is designed for several levels of work, and arranged so that it can be used as an elementary text by omission of the more detailed parts of the chapters. Twenty-one phyla of invertebrates are discussed, and a short chapter is devoted to conodonts. Considerable emphasis is placed on the morphology of the soft parts, and the relations of the latter to the former. In each chapter there is one part devoted to the consideration of the classification of taxonomy of each phylum. Classification is carried as far as orders in the all-important groups, and as far as superfamilies or families in a few phyla or divisions of phyla which has a particularly important fossil representation. Attention is paid to the onotogeny and phylogeny of each phylum and paleocology is briefly discussed. In this test all of the important developments of the past 16 years are covered, including the latest methods and theories of classifications. The book is another in the publisher's series in geology.

Answer to "Check Chart"

This week's puzzle picture, appearing on page 82, is correctly identified as a crude-oil production header serving 16 wells. The installation is on the Denton lease batteries of Phillips Petroleum Co., Denton field, Lea County, New Mexico.



BANK OF THREE filters installed on Helmerich & Payne drilling rig at location for Magnolia Petroleum Co. 8 Anderson.

Dry Filters Being Used in Westex Sour-Crude Areas To Clean Field Gas for Fuel

Roy F. Carlson

IN order that sour field gas may become an economical, efficient fuel for drilling engines, it must be cleaned of corrosive components, much of its water content, and any liquid hydrocarbons. If this is not done, advantages gained from use of the cheap field gas may be offset by frequent replacement of spark plugs and valves, or repair or replacement of the pressure-regulation equipment at the drilling-engine carburetor.

Caustic scrubbers, amine treating units, and other varieties of treating equipment have been used with varying degrees of success to remove H_2S, water, and liquid hydrocarbons. The so-called dry filters or treaters are also being used on some rigs in the sour-gas areas, an installation of this kind being shown in an accompanying picture.

Operation . . . In the setup shown, three of the filter units are being operated, with the units installed in parallel, permitting shutting down any one unit for changing of elements while the others are operating. Valving permits this cutting out of a unit, and also permits periodic draining of the sump in each filter if that becomes necessary.

Each of the filter tanks contains a series of three nests of filter elements arranged vertically in groups of seven in the filter tanks. Each of the elements fits around a perforated pipe and covers the perforations in the pipes. These pipes lead to the discharge area of the filter, passing through a sealed tube sheet or baffle plate.

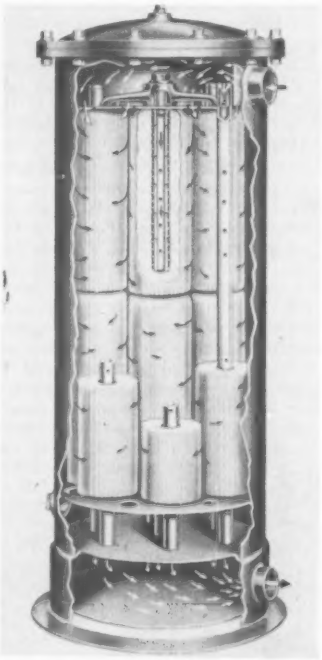
Incoming gas enters the tank, fills the area around the outside of the filter elements, and must move through the elements to the outlet before going to the engines, all of the gas being filtered in the process. Most of the water or other liquids are caught on the surface of the filter elements and drain downward onto the top of the tube sheet. This tube sheet is tilted toward a drain plug forming a sump from which accumulated materials may be drained from the filter.

Filter elements . . . The filter elements are formed of a mixture of chemically treated fibers that are covered by an elastic knitted-type cover. The cover is made water repellant so that much of the water is trapped out by the element surface. As the gas moves through the filter, it contacts the treated fibers and the chemicals, neutralizing acid gas such as hydrogen sulfide before it enters the engine. At normal rates of operation, pressure drop across the filters is about 2 psi.

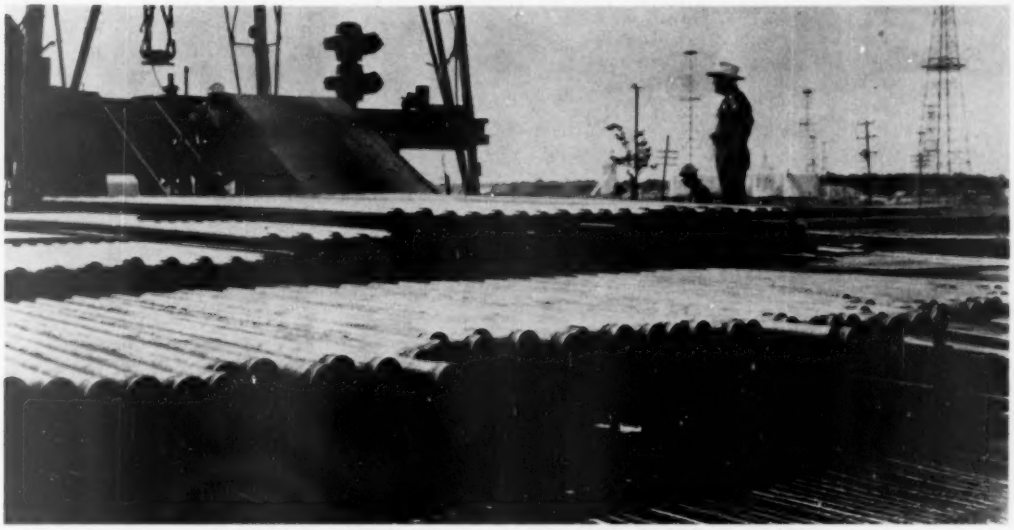
Varied results . . . A limited number of these installations have been placed in the gas supply to drilling engines with varied results. In one West Texas installation, spark-plug life was increased from 10 to 120 days, with like results for fuel-gas regulators at the engines.

In another case plug and regulator life was more than tripled.

The filters described here are manufactured by Winslow Engineering Co.



CUTAWAY DRAWING of filter. Filters are installed on the fuel gas supply line to a drilling rig. Valving is arranged so that any one of a number of units installed in a bank may be shut down for replacement of filter elements, or to drain accumulated liquids from the filter's sump.



REINFORCED PLASTIC PIPE for use as well tubing resists salt-water corrosion.

Reinforced Plastics in Wider Field Use

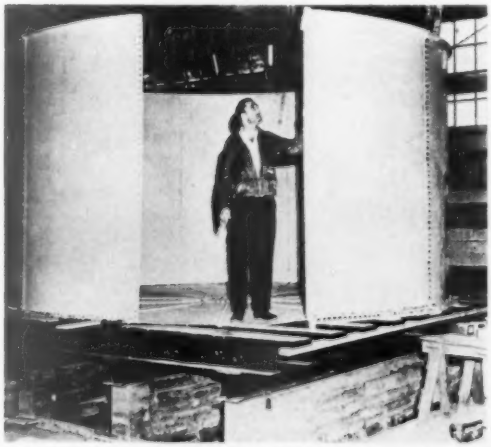
George Weber

RESISTANCE to corrosion, plus strength and toughness, are the principal properties promoting the wider industrial use of reinforced plastics, according to representatives of the Society of the Plastics Industry.

In the petroleum industry, these new materials are finding use in salt-water pipe strings, lease tanks, and tank trucks. The fastest-growing division of the plastics industry is the one which combines plastics with reinforcement to make these structural materials, the plastics society learned at a recent meeting. This division of the plastics industry increased its production 40 per cent last year.

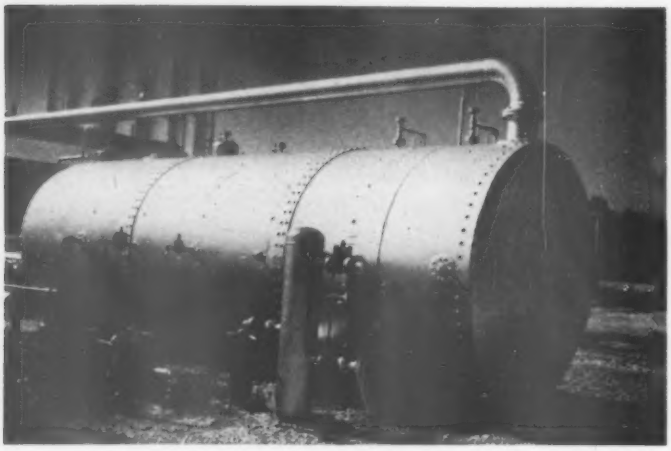
To date most of the materials consist of polyester resins reinforced with fibrous glass. Over 16,000,000 lb. of fibrous glass will go into this market in 1953, together with an estimated 27,000,000 lb. of polyester resins.

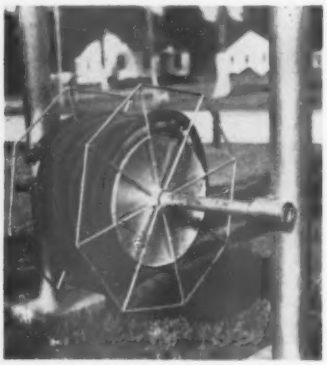
The products shown in these photographs are all made of the polyester plastic, reinforced with fibrous glass.



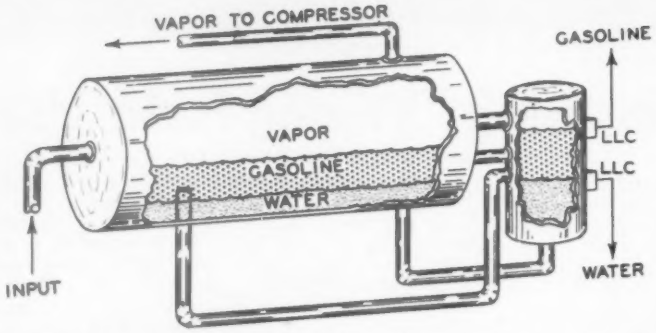
BOLTED LEASE TANK of fibrous glass and polyester resin resists corrosion from hydrogen sulfide and salt-water electrolysis. This 250-bbl. tank made by Murdock Tank & Manufacturing Co., Tulsa, can be stacked two high to make a 500-bbl. unit.

REINFORCED PLASTIC TANKS were selected for tank trucks used by Arabian American Oil Co. in hauling water and fuel across the Arabian desert, because of their ability to stand up under severe sand abrasion, corrosion, and weather conditions.





2 Arms on this steam-hose reel facilitate rolling of the hose. Hose is used in case of fire, and also for cleaning and maintenance purposes around the gasoline plant.



1 A twin system of liquid-level controls is used on this separator. Crude distillate comes from the field through a flow treater and into separator vessel. Inlet flow consists of a mixture of water, hydrocarbon vapor, and gasoline. Water settles to bottom of separator, gasoline floats on top of the water, and vapor fills space above the gasoline level. Outlet vapor line is to suction of station compressors. Two floats are in level-control instrument, lower one working on water-gasoline interface discharging water at proper rate to keep level constant in tank; the other works at interface of gasoline and vapor, discharging gasoline at proper rate to keep it at constant level.

3 Steam-driven pump on raw 64°-gravity distillate has 125-ft. long suction line. Pump had been giving trouble due to loss in head in suction line. To compensate for loss, small tank made from 6 ft. of 10-in. pipe was built and placed in flow line just prior to pump suction. Liquid level in small tank is at same height as in storage tank, and suction head of pump is thus increased. No further trouble has been encountered.

Here are unusual features Of Sunray's gasoline plant

A NUMBER of unusual features have been incorporated into the design of Sunray Oil Corp.'s gasoline plant at Elton, La., which provide for more efficient operation.

These photographs show a few of the many innovations and specially adapted installations which not only make for more efficient operation, but result in savings in both time and labor, and money.

G. E. Boyd is superintendent of this gasoline plant, which is located in Jefferson Davis Parish.

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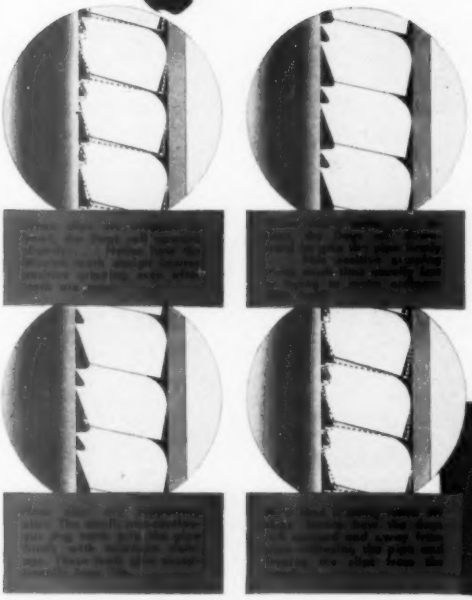

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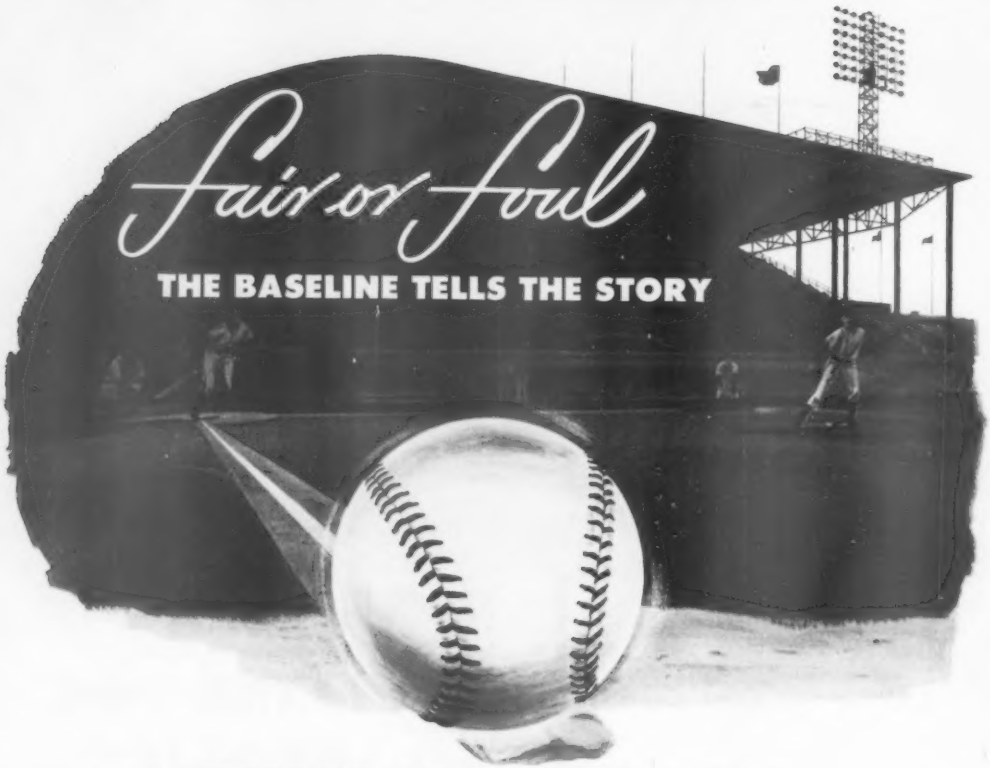

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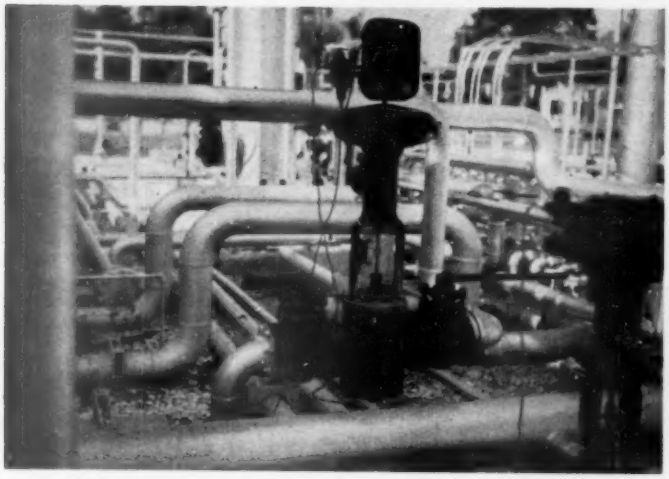
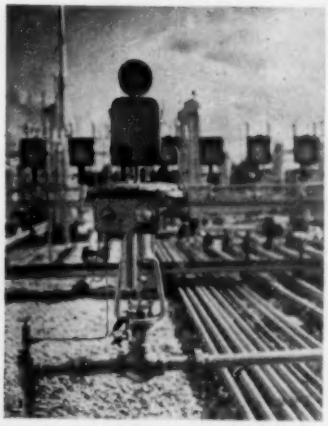
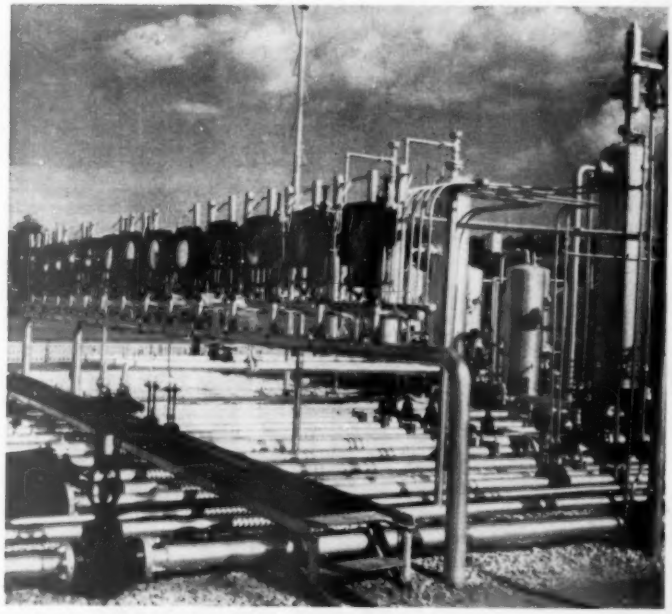


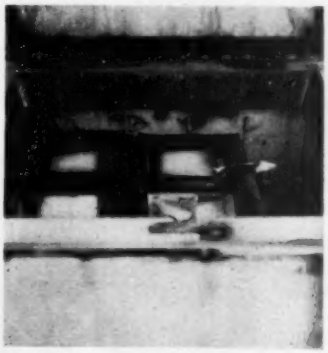
4 This is a motor valve on the discharge of a gas compressor. Suction pressure on this compressor is 0 psi. Discharge is to the suction of a second compressor. When second compressor is taken out of service, the motor valve switches the first compressor discharge gas from the second compressor suction to a 50-psi. header. Gas from this header is fed to other compressors.



5 Gas from high-pressure casing-head system is used for gas-lifting crude from crude sand. When volume of gas from system drops below that necessary for efficient crude production, motor valve automatically cuts in enough gas from high-pressure 8,800-ft. gas-distillate sand (at 2,700 psi.).



6 All master flow meters from the gas wells at Sunray Oil Corp.'s gasoline plant in Jefferson Davis Parish, Louisiana, are grouped together and lined up at eye level for easy reading and maintenance. G. E. Boyd is superintendent of the plant, located at Elton, La.



7 Plenty of ice for the isolated gasoline plant! Ice is made at plant by expanding propane through coils in brine solution. Cold brine circulates over the ice pans, freezing the water contained therein. Value of the propane used is insignificant, and costs less than it would take for gasoline for a car to go get the ice.

Turn Your Ideas Into Cash

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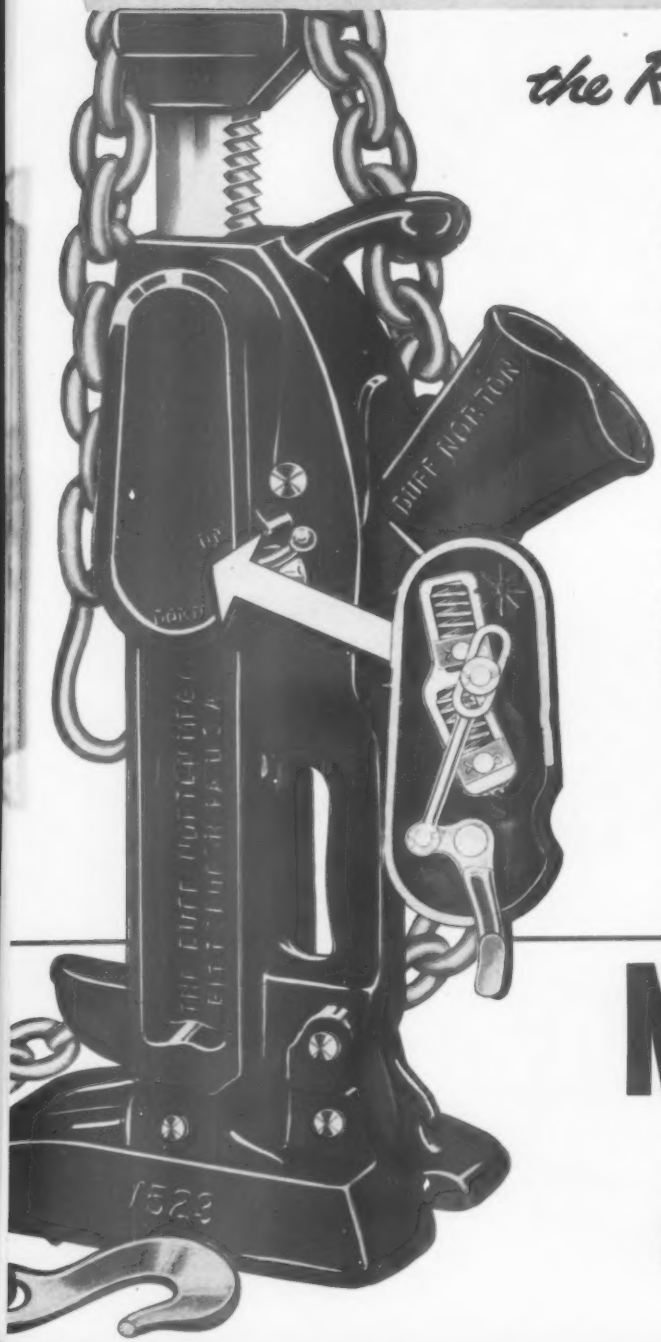
The Journal pays cash for all acceptable items. Address yours to: Editor, "On the Job," The Oil and Gas Journal, Box 1260, Tulsa, Okla. Photographs and manuscripts will be returned if requested.

Why this special oil field jack will give longer trouble-free service



the Roustabout "1523"

When Duff-Norton engineers set out to design safer, longer-lasting jacks for men who work in the oil fields, they discovered one startling fact—about 90% of jack maintenance was in replacing worn springs in the mechanism that controls the jack's raising or lowering action. Result? The Duff-Norton Roustabout "1523" oil field jack is equipped with a patented*, adjustable spring mechanism which assures positive engagement of rack teeth. The spring's tension can be easily adjusted with a screw driver without removing any part of the jack. Should the spring eventually lose its resiliency, there's no need to send the jack to a repair shop. A new, complete spring mechanism assembly can be quickly installed by anyone in a matter of minutes right in the field, making the jack as good as new!

Complete with detachable steel chain, this versatile jack can be operated at any angle at its full 15-ton capacity. Ask your supply store salesman for the Duff-Norton Roustabout "1523." He has it in stock or can get it for you quickly. For complete specifications on this and other dependable Duff-Norton jacks, write the world's oldest and largest manufacturers of lifting jacks for special Oil Field Jack Bulletin AD19B, The Duff-Norton Manufacturing Co., P. O. Box 1889, Pittsburgh 30, Pa. Canadian Plant—Toronto 6, Ontario.

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THE JOURNAL'S WEEKLY
Engineering Reference
SECTION

GAS TURBINES AND CENTRIFUGAL COMPRESSORS—4

Description of Gas Turbine

by T. R. Rhea* and J. S. Quill*

MOST important information required for selection of design point is the maximum normal flow of pipe line. In this particular illustration 1,050 million standard cubic feet per day at 813 psia. discharge pressure was selected. The maximum horsepower available is in this case the 5,000 hp. summertime 80° F. rating. The summer rating was selected in order to be conservative.

With these two limits set, the pressure ratio available is pretty well defined. The selection of a design point speed, in this case 4,750 r.p.m. should give ample margin to speed up the units to their maximum of 5,500 r.p.m. and thus absorb the available wintertime horsepower of 6,400 at 40° F. ambient.

The gas turbine considered here is rated at 5,000 hp., 5,000 r.p.m. at an 80° F. ambient and at 1,000 ft. altitude. It is a two-shaft adjustable-speed machine with a thermal efficiency, when using a regenerator (heat exchanger), of 25 per cent based on the lower heating value of the gas.[1] The regenerator is furnished with the unit. Only the one rating and design is considered applicable to gas-pipe-line pumping, in most cases. General Electric Co. has other designs available but they are considered more suitable to central-station power generation, locomotive power plants, and other applications.

*General Electric Co. From paper presented at A.S.M.E. meeting, December 1952.

Starting . . . Since the gas turbine does not have the ability to start itself, it is started with gas pressure from the pipe line expanding to atmosphere through an expansion starting turbine. This gas is not burned. The expansion turbine is declutched when the main turbine is able to sustain itself.

Fig. 1 shows the schematic flow diagram of the turbine. It should be noted that the shaft of the load turbine is mechanically separate from the axial flow compressor and its driving turbine. This separation permits a wide range of speed at almost constant horsepower output.

Flat characteristics . . . Selection of the design point was discussed in last week's installment. A design-point speed of 4,750 r.p.m. was selected for the case considered. This gave ample margin, so that the available wintertime horsepower of 6,400 at 40° F. ambient could be absorbed by speeding up the units to the maximum of 5,500 r.p.m. This is an important point and illustrates why the flat available horsepower speed characteristics obtainable from a two-shaft design of gas turbine shown in Fig. 2 are desirable.

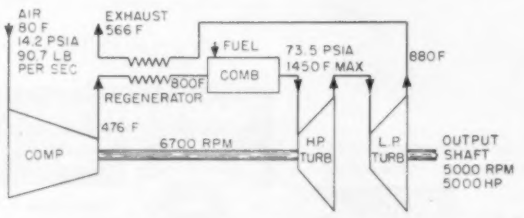


Fig. 1—Schematic diagram of 3,500-kw., 5,000-hp., regenerative cycle gas turbine.

This figure illustrates the maximum available horsepower as a function of load shaft speed for several ambients. For example, a compressor may be picked up at its design point of say 4,750 r.p.m. to absorb 5,000 hp. available at 80° F. ambient, or in cold weather, as noted, to absorb maximum available output of some 6,400 hp. This flexibility is desirable both to the compressor designer and to the application engineer. Single-shaft gas turbines have their available horsepower fall off very sharply with speed and do not give such flexibility. It is for this reason that two-shaft designs were selected for gas pipeline pumping.

Adjustable nozzles . . . Perhaps one other feature of the gas turbine should be mentioned. Adjustable nozzles are placed between the high-pressure and load (low-pressure) turbine. These adjustable nozzles are automatically controlled from the governing system.[2] Their function is to permit a transfer of the heat energy available between the high and low pressure turbines.

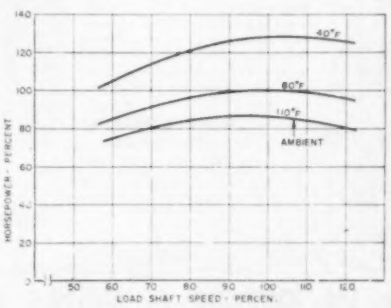


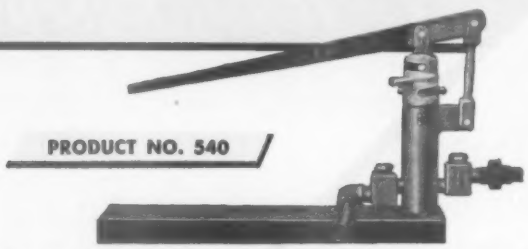
Fig. 2

References

1. "Design Features of a 5,000 hp. Gas Turbine," B. O. Buckland and D. C. Berkey; A.S.M.E. paper No. 51A113.

2. "Control of Gas Turbine Power Generation," N. E. Starkey, D. C. Hoffman, and A. G. Meller; A.I.E.E. 1950 Vol. 69.

They Call Me HANDY ANDY



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R. C. King†

INSTRUMENTS

Proportional Sampling Device for Metered Liquids

MANY plant product streams must be sampled for laboratory analysis as well as metered for accurate calculations of production. Since both the analysis and flow rate vary, samples must be taken which have a direct relation to the product flow rate. For such liquid product streams, the sampler shown in Fig. 1 was developed.

A flow integrator was installed in the existing meter. The integrator cam was made to operate a microswitch for each increment of product flow. The microswitch in turn energizes a threeway solenoid valve through which air supply is admitted to or bled from two diaphragm-motor-operated needle valves in the sample line. The control valve nearer the main product line is of the air-to-open type and the second valve is of the air-to-close type. Between the two valves is a sealed sample trap arranged to drain when pressure on the line is released.

In operation, as each equal increment of product flows through the main line, the integrator cam trips the microswitch. Air pressure is supplied to both control valves, opening the valve upstream from the sample trap and closing the valve downstream from it. A definite quantity of sample is trapped between the two valves. When the integrator cam advances, it releases the microswitch and deenergizes the three-way solenoid valve. The air from the diaphragm motors is bled off allowing the upstream valve to close and the downstream valve to open. The trapped sample drains to a sample container. At the end of each shift or each day, accumulated sample in the container is mixed and a laboratory sample taken from it. The container is then drained and is ready to accumulate the sample for the next period.

This sampling system has performed very well in a number of installations over the past several years with a minimum of maintenance. The accuracy of the sampling system has proved to be within the accuracy of flow-meter measurements.

*Superintendent, Instrumentation, and †Assistant Superintendent Instrumentation, Dow Chemical Co., Freeport, Tex. Presented at symposium on Instrumentation for the Process Industries, A. & M. College of Texas, 1953.

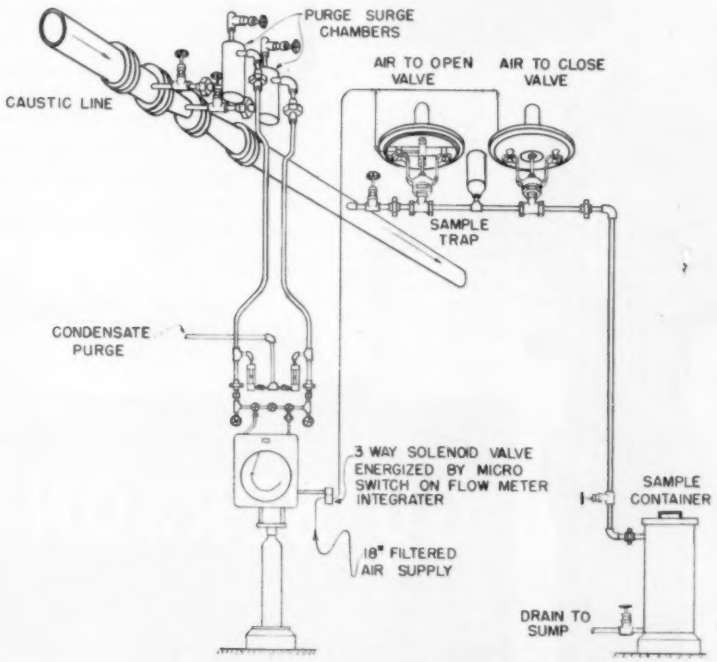

Fig. 1—Flow meter and proportional sampler.

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by
Ralph F. Nielsen*

Use of Electric Models in Predicting Production Behavior—Steady State

THE prediction of the production behavior of a reservoir depends upon the proper application of two basic laws. One of these is D'Arcy's law as applied to the separate fluids, oil, gas, and water. The other is the law of conservation of matter as applied to the fluids. To predict pressure changes with time and distance and the movement of fluids so that these laws are obeyed at all points, and so that, at the same time, changes in the fluids with pressure, over-all production, and terminal pressures are accounted for, has been a difficult and often insurmountable problem.

Since electrical flow is governed by laws exactly analogous to those for flow in porous media, it is quite natural that electric models have been used to help solve certain oil-production problems.

The similarity of Ohm's law to D'Arcy's law is immediately apparent:

$$i_x = -\frac{1}{r}\frac{dP}{dx} \qquad (1)$$

where i_x is the current in the x direction per unit cross-section of conducting material, r the specific resistance, and dP/dx the potential gradient in the x direction. The equations relating to accumulation (or depletion) at a point are also similar. If, for instance, fluid flow is linear and in the x direction and is of magnitude v in centimeters per second per square centimeter cross-section, then:

$$\frac{dM}{dt} = -\frac{dv}{dx} \qquad (2)$$

where M is the mass of material per cc. of porous medium at the given point. Equation 2 is the "continuity equation" for this particular case. If there is to be accumulation in the case of electrical flow, the system would have to include some means of storing electricity such as a series of condensers.

In the case of steady-state flow there is no accumulation or depletion with time at any point, and electric analogs may be set up with only resistors and sources of potential. One of the earliest electric models to be applied to oil production[1] was designed to study flow lines and equipotential lines in secondary-recovery operations, where fluid is injected into some wells and removed from others.

The formation was simulated by a solution containing copper sulfate or a mixture of a copper salt and ordinary salt. Variations in sand thickness were compensated for by paraffin in the bottom of the bath. The electrodes or "wells" were round copper tubes, immersed according to the "well penetration." The electrodes serving as input and producing wells respectively were joined together and current made to flow from one group to the other. Equipotential lines could then be located with a probe connected to a potentiometer and galvanometer system (Fig. 1), and the location of these lines was mapped on paper.

Thin sheets of metal foil or other conducting materials have often been substituted for the electrolyte bath. A sensitive galvanometer, good contact at the perimeters of the wells, and heavy conductors joining like wells are essential when metal foil is used, because of its high conductivity. In accordance with the usual flow formulas, the potential gradients and hence the spacing of the equipotential lines is very sensitive to the well diameters, as well as to any failure to make contact completely around the well perimenters. It is, therefore, usually impractical to represent an unshot well directly to scale.

The flow lines are drawn perpendicular to the equipotential lines (Fig. 2). This procedure has been described in a previous number of this series. The shape of the "front" and the area swept by the injected fluid can also be calculated from the potential gradients along the flow lines. The picture of the front as it approaches the producing wells is affected by the diameters of the electrodes as is also the movement with reference to the time scale. In a simple setup no allowance is made for differences in viscosities between the produced and injected fluid or for permeability variations.

The movement of a front has been demonstrated by using a saline solution which has been set up with agar or gelatin. The electrodes and salt used are such as to cause a color change as the movement of ions carry the current through the solution. For, instance, if the inputs are represented by copper anodes and the salt solution contains some ammonia, a blue front will progress from "inputs."

A pool under primary production is represented by having all the wells connected to the same terminal of the current supply. Differences in the flow of individual wells would have to be controlled by resistors in series with the corresponding electrodes. The shape as well as the spacing of electrical equipotential lines beyond the outer wells would then correspond to those of the field insofar as the other assumptions (steady state, uniform permeability, etc.) are valid. With the usual idealized assumptions the equipotential lines become circles as the distance from the group of wells becomes large.

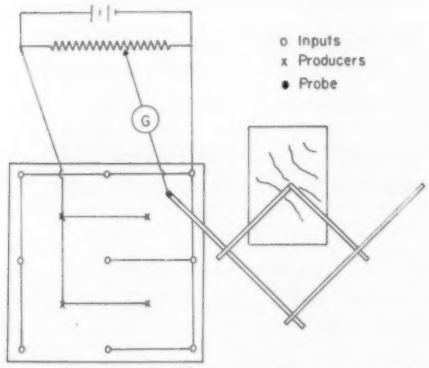

Fig. 1—Device for locating equipotential lines in a five-spot under steady-state flow.

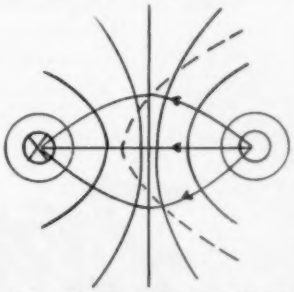

Fig. 2—Equipotential lines, flow lines, and "front" in a five-spot under steady flow.

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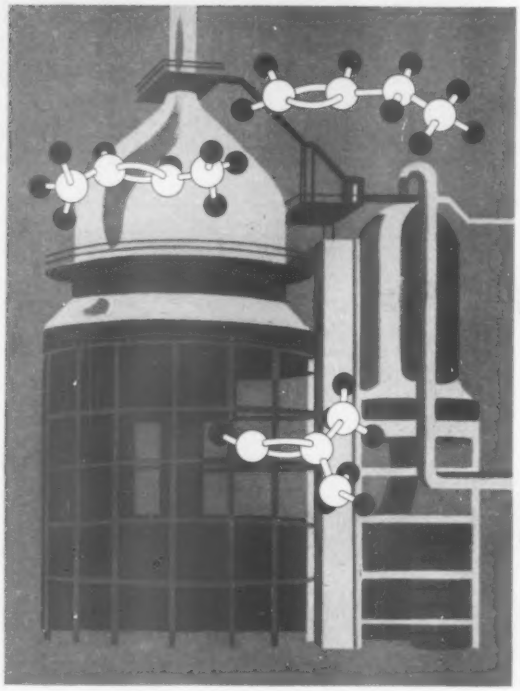
J. C. Calhoun, Computation of Fluid Displacement From Equipressure Lines, The Oil and Gas Journal, No. 367, this series, April 14, 1949, page 123.

*Associate professor, petroleum and natural-gas engineering, Pennsylvania State College.



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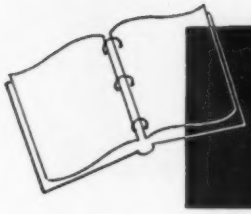

REFINER'S NOTEBOOK

HEATING-TUBE FAILURES—1

Specifications, Furnace Design

by J. J. B. Rutherford*

HEATING tubes, designated as boiler, superheater, still, or heat-exchanger tubes are defined in numerous specifications[1] of the American Society for Testing Materials. A similar class of product for use at elevated temperatures is to be found in A.S.T.M. Piping Specification A312 and A335. These basic specifications are recognized in various state codes and serve as the background for numerous private, industrial specifications. The products covered represent standard dimensions which have been found suitable in furnace design and chemical compositions which have been accepted by the industry on the basis of laboratory and service experience. These specifications describe (1) the acceptable dimensional tolerances, (2) surface conditions, (3) heat treatment, (4) mechanical properties, and (5) methods of testing. A point seldom realized is that these material specifications tend to define a product suitable for immediate fabrication rather than suited to ultimate service—and these are not the same.

Carbon steel tubes . . . These cover most of the requirements for heating up to 500° F., but occasionally nonferrous materials are used to meet peculiar corrosion conditions. These tubes are specified of low hardness values, as are ordinarily obtained with low-carbon steel, but which require tedious annealing in the case of the higher-alloy compositions. Such practices as expanding or rolling-in, and bending are more easily performed with metal of low hardness. It is generally assumed that steel in the annealed condition is free from internal stresses and therefore is less likely to crack on welding or rapid heating in initial service.

Furnace design . . . In order to obtain a fluid at a prescribed rate and temperature, the furnace engineer must be familiar with the specific heat, the flow characteristics and, the phase changes encountered with variations in temperature and pressure. With these parameters blocked out, he then determines the length and cross-section of the column of fluid to be exposed within the furnace. The length must be broken down to units which are commercially available; this entails the use of headers or return bends, which restricts the fluid flow and requires a longer column for heating.

After consideration of other details too numerous to describe here, a basic furnace chamber is designed to contain a number of tubes. Because of the thermal head necessary to drive heat through the wall, the outside metal temperature will be higher, depending on heat release, than the product at that location. The product will change at essentially a uniform rate from the inlet to the outlet temperature, but the tubing temperature may be, for example, 250° F. higher at the inlet, and 100° F. higher at the outlet.

Higher temperature . . . The wall thickness of the tube determines its heat transfer rate and its cost. Above 500° F. a suitable selection is made from among numerous chromium-molybdenum-nickel type alloy steels, depending on estimated attack by furnace gases on the outside and by the product on the inside. The heating unit is frequently divided into different temperature zones, and a different steel may be selected for each zone.

Wall thickness . . . The next step is generally the most critical in furnace design: determination of appropriate wall thickness. The fiber stress resulting from internal pressure is determined from slight modifications of the Barlow or Lamé formula, wherein the maximum working stress is selected from available data on rate of creep, creep-rupture, or when other information is lacking, tensile strength at elevated temperatures. Many theories have been advanced[2] on the flow of metals and numerous fundamentals are well established. However, recourse is still necessary to empirical tests[3] such as covered in recent resumes by the A.S.T.M.-A.S.M.E. High-Temperature Committee.

High-Temperature Data

Earlier high-temperature data were based entirely on the creep rate, either 1 per cent extension in 10,000 hours or 100,000 hours. This compares somewhat with measurements of elongation in a structure which is expected to be elastic in behavior. The more recent trend is towards the use of creep-rupture data. The equipment for measuring these two sets of properties is essentially the same, but the latter is carried on to failure. The designer is more prone to apply a safety factor against a known end point, i. e. destruction, than he is with some indeterminate but intermediate point. Then there is the embarrassing feature that some of the "superalloys," on extended test time, do not elongate as much as 1 per cent before failure occurs.

*Babcock & Wilcox Co., tubular products division. From paper presented at John Zink Process Heating Seminar, Tulsa.

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Use and Care of Wire Rope—4*

PREVIOUS installments on this subject appeared in issues of December 22, 1952; January 5, 1953; and February 2, 1953. Subjects discussed were moving, loading, storing, kinks, inspection, installing, breaking in, and safe working loads of wire rope.

Seizing and cutting . . . Great care is used in the manufacture of wire rope to produce a balance of equal tension among the strands. This will be lost if insufficient seizings are applied before cutting. When a rope is to be cut in the warehouse or in the field, place seizings of annealed wire on both sides of the point where the cut is to be made. If this is not done, the balance will be disturbed, one or more strands will slip back, and others will carry more than their proportion of the load.

For iron ropes and small steel ropes, at least two seizings should be applied on each side of the place to be cut. For steel ropes from 1 to 1½-in. diameter, inclusive, three seizings should be the minimum; for steel ropes larger than 1½-in. diameter, four seizings should be the minimum. These seizings should be put on a short distance apart, and the length of the seizing should be at least equal to the diameter of the rope.

One seizing, at least, should be applied to each side of the point where preformed rope is to be cut, to prevent distortion of the rope at the instant of cutting.

*Taken from Bulletin 61, Use and Care of Wire Rope, A. Leschen & Sons Rope Co.

Method A . . . For this seizing the ends of the wire are brought out at the same end of the seizing. This is done by laying one end of the wire in the groove between two strands and wrapping the other end of the wire back over this portion. A "seizing stick" should be used to keep the necessary tension in the wire. When the seizing has been completed the ends of the wire should be twisted tightly together. Shown in picture are: (1) general view of operation; (2) side view of the "seizing stick," showing how it is wired; (3) a closeup of the "stick" in operation; and (4) finished seizing made by Method A.

Method B . . . The various steps in this method are as follows:

1. Wind the seizing wire on the rope by hand, keeping the coils together and considerable tension on the wire.

2. Twist the ends of the wire together counterclockwise by hand, so that the twisted portion of the wires is near the middle of the seizing.

3. Using Carew cutters, tighten the twist just enough to take up the slack. Do not try to tighten the seizing by twisting.

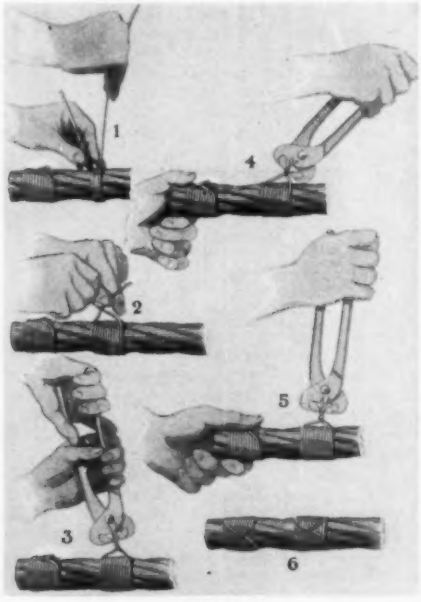
4. Tighten the seizing by prying the twist away from the rope with the cutters.

5. Tighten the twist again as in (3). Repeat (4) and (5) as often as is necessary to make the seizing tight. Cut off the ends of the wires and pound the twist flat against the rope.

SEIZING WIRE TABLE

Rope diameter (in.)—	Wire gage	No. of seizings	Length (in.)	Distance apart (in.)
½ to $\frac{7}{16}$ incl.	24 annealed	2	½	1
½ to ⅝	17 annealed	2	¾	1
$\frac{11}{16}$ to ⅞ incl.	16 annealed	3	1	2
1 to 1¼ incl.	14 annealed	3	1½	2
1⅜ to 1⅞ incl.	12 annealed	3	2	3
2 and up	10 annealed	4	3	3

Method A.



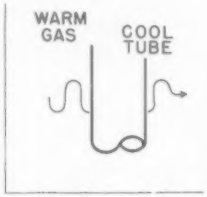
Method B.

Part 26 of a series

by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of a COOL TUBE and a WARM GAS



Tube Position: Vertical

Gas Movement: Turbulent Flow.

Direction of Movement: Normal to tube.

EQUATION:

$$h_f = 0.26 \frac{k}{D_o}\left[\frac{D_o V \rho}{\mu}\right]^{0.6}\left[\frac{C\mu}{k}\right]^{0.3}$$

TERMINOLOGY:

- h_f - Film coefficient of heat transfer, BTU/hr. sq. ft. $^oF.$
- K - Thermal conductivity of gas at t_f, BTU/hr. ft.^{2} $^oF./ft.$
- D_o - Outside diameter of tube, ft.
- V - Velocity through minimum free area, ft./hr.
- ρ - Density of the gas, lb./cu. ft.
- μ - Viscosity of gas at t_f, lb./ft. hr.
- C - Specific heat of gas at constant pressure, BTU/lb.$^oF.$
- t_f - Film temperature, assumed as arithmetic average of wall temperature and bulk gas temperature, $^oF.$

LIMITATIONS:

To be used for Reynolds numbers ($DV\rho/\mu$) between 1000 and 50000.

SIMPLIFIED EQUATION: For gases at moderate temperatures and Reynolds numbers from 1000 to 50000

$$h_f = \frac{0.111\ C\ (V\rho)^{0.6}}{D_o{}^{0.4}}$$

For air

$$h_f = \frac{0.025\ (V\rho)^{0.58}\ (1+0.000576t)}{D_o{}^{0.42}}$$

PHYSICAL CONSTANTS: See Chemical Engineers' Handbook - J. H. Perry (1948).

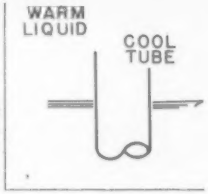
for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1588, 1696.

REFERENCES:

1. Chemical Engineers' Handbook, J. H. Perry, p. 472.
2. Heat Transmission, William H. McAdams, p. 228.
3. Introduction to Heat Transfer, Brown and Marco, p. 109.

I 1 c

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of a COOL TUBE and WARM LIQUID



Tube Position: Vertical

Liquid Movement: Streamline Flow

Direction of Movement: Normal to tube.

EQUATION:

$$h_f = 0.86 \frac{k}{D_o}\left[\frac{D_o V \rho}{\mu}\right]^{0.43}\left[\frac{C\mu}{k}\right]^{0.3}$$

TERMINOLOGY:

- h_f - Film coefficient of heat transfer, BTU/hr. sq. ft. $^oF.$
- k - Thermal conductivity of liquid at t_f, BTU/hr. sq. ft. $^oF./ft.$
- ρ - Density of liquid at t_f, lb./cu. ft.
- μ - Viscosity of liquid at t_f, lb./ft. hr.
- C - Specific heat of liquid at constant pressure in BTU/lb. $^oF.$
- t_f - Film temperature, assumed as arithmetic average of wall temperature and bulk liquid temperature, $^oF.$
- V - Velocity through minimum free area, ft./hr.
- D_o - Outside diameter of tube, ft.

LIMITATIONS:

To be used for Reynolds numbers ($DV\rho/\mu$) from 0.1 to 200.

Should give results ± 10% of experimental.

SOURCES OF DATA:

For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

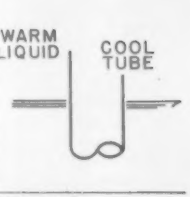
for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1588, 1696.

REFERENCES:

1. Heat Transmission, William H. McAdams, pp. 226.
2. A. P. Colburn, Trans. Am. Inst. Chem. Engrs., 29, pp. 174-210 (1933).
3. Applied Heat Transmission, H. J. Stoever, p. 58.
4. A. H. Davis, Phil. Mag. 47, pp. 972, 1057 (1924).

I 2 b (1)

COEFFICIENT of HEAT TRANSFER through FILM between OUTSIDE SURFACE of a COOL TUBE and WARM LIQUID



Tube Position: Vertical

Liquid Movement: Streamline Flow

Direction of Movement: Normal to tube.

EQUATION:

$$h_f = \frac{k}{D_o}\left[0.35 + 0.47\left[\frac{D_o V \rho}{\mu}\right]^{0.52}\right]\left[\frac{C\mu}{k}\right]^{0.3}$$

TERMINOLOGY:

- h_f - Film coefficient of heat transfer, BTU/hr. sq. ft. $^oF.$
- k - Thermal conductivity of liquid at t_f, BTU/hr. sq. ft. $^oF./ft.$
- ρ - Density of liquid at t_f, lb./cu. ft.
- μ - Viscosity of liquid at t_f, lb./ft. hr.
- C - Specific heat of liquid at constant pressure in BTU/lb. $^oF.$
- t_f - Film temperature, assumed as arithmetic average of wall temperature and bulk liquid temperature, $^oF.$
- D_o - Outside diameter of tube, ft.
- V - Velocity through minimum free area, ft./hr.

LIMITATIONS:

For Reynolds number ($DV\rho/\mu$) above 200.

No top limit set but probably not satisfactory for Reynolds numbers above 1000.

SOURCES OF DATA:

For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

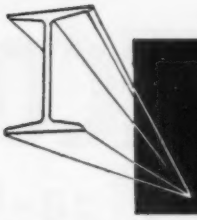
for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
k -- see pp. 459-461, 1303, 1697.
C -- see pp. 225-235, 297, 1588, 1696.

REFERENCES:

1. Heat Transmission, William H. McAdams, pp. 226.
2. Chemical Engineers' Handbook, J. H. Perry, p. 472.
3. Applied Heat Transmission, H. J. Stoever, pp. 87, 90, 91 (1941).
4. J. Ulsamer, Forsch. Gebiete Ingenieurw, Vol., 3, p. 94 (1932).
5. H. Reiher, Mitt. Forsch., Vol., 269, pp. 1-85, (1925).

I 2 b (2)

by W. L. Nelson
Technical Editor



PROGRESS IN METALS

Sulfide Resistance of Chromium Steels

CHROMIUM in steel not only exerts a specific effect in reducing oxidation or rusting *(see Progress in Metals, February 2, 1952, "Stainless Steels in Petroleum Refining")* but it is about the only element that acts specifically in reducing "sulfide" corrosion. However, small additions of silicon and aluminum greatly increase the resistance of chromium steels. Unfortunately, these elements cannot be used in even small amounts without having adverse effects on the physical properties of most steels. According to Clark and McCollam, "Silicon and Aluminum Adidtions," Ref. Nat. Gaso. Mfr., July 1939, p. 287, silicon and aluminum have the following effect on sulfide resistance:

Per cent silicon plus two times per cent aluminum	Percentage penetration compared with chromium molybdenum steels
0.27	100
0.4	82
0.6	70
0.8	62
1.0	57
1.3	51
1.8	43

Although molybdenum is often included in the chromium tube or high-temperature casting steels in order to gain strength (or creep strength) at elevated temperature, it probably, in the amounts customarily employed for this purpose (0.5-1.0 per cent), causes a decrease in sulfide resistance. At least the plain molybdenum (carbon moly) and plain low-nickel steels are under some conditions attacked more actively by sulfide corrosion than the plain carbon steels.

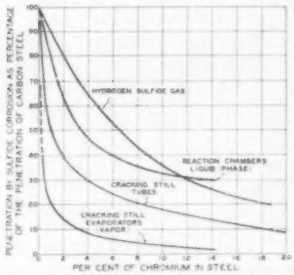

PENETRATION BY SULFIDE CORROSION AS PERCENTAGE OF THE PENETRATION OF CARBON STEEL
HYDROGEN SULFIDE GAS
REACTION CHAMBERS LIQUID PHASE
CRACKING STILL TUBES
CRACKING STILL EVAPORATORS VAPOR
PER CENT OF CHROMIUM IN STEEL

Fig. 1—An indication of the extent of sulfide corrosion in thermal cracking plants.

The actual magnitude of sulfide resistance cannot be stated with certainty because of the great variety of conditions that are encountered and because of the various types of sulfur compounds (or other agents) that may be involved but the general relationship is as follows:

	Attack relative to plain carbon steel	Range of Experimental Data	Relative Cost (Approx.)
Plain carbon	100	.....	1.0
1 per cent chromium	54	(21-88)	1.9
2 per cent chromium	43	(6-77)	2.1
4 per cent chromium	35	(10-60)	3.0
6 per cent chromium	31	(7-50)	4.2
9 per cent chromium	24	(4-38)	5.3
12 per cent chromium	18	(2-31)	7.5
18 per cent chromium	13	(1-36)	11.0
25 per cent chromium	6	.....	18.0

Although the application of the chromium steels cannot, from the figures of this tabulation, be justified on a plain cost basis, other advantages such as safety in operations, cost of repairs and maintenance, greater strength or oxidation resistance, etc., usually justify the use of the chromium steels for conditions in which sulfide corrosion prevails.

Something of the variety of conditions that may be encountered is indicated in Fig. 1 *(Nelson, W. L., Corrosion Resistance and Strength of Pipe Still Tubes, The Oil and Gas Journal, April 17, 1941, page 179)*. This figure is also valuable because it indicates the extent of sulfide corrosion in thermal cracking plants. Thus, chromium steels are indicated for such expensive and vital items of equipment as cracking-still tubes, fractionating towers, and gas-handling parts of a cracking system, but may not be indicated for such somewhat simple equipments as evaporators (flash chambers) or liquid-phase reaction chambers. However, evaporators and reaction chambers are frequently constructed of clad (chromium) steel or more frequently they are lined with chromium steel.

Temperature is indirectly of much significance in connection with sulfide corrosion. Hydrogen sulfide does not appear in petroleum except in those crude oils that are called "sour" crude oils and accordingly, sulfide corrosion is not ordinarily troublesome except at temperatures at which sulfur compounds decompose liberating hydrogen sulfide. Thus, sulfide corrosion becomes noticeable at about 400° F. (as in high-temperature topping or reducing systems) and quite active at 600°-900° F. as in thermal or catalytic cracking plants. At higher temperatures the severity of corrosion appears to decrease slightly. This results in somewhat the following usage:

	Lines and Fittings	Expensive Equipment
Up to 450°-550° F.	No Chromium	5% Chromium
450°- 800° F.	5- 8% Cr.	7-12% Cr.
700°- 950° F.	7-12% Cr.	12-18% Cr.
900°-1,000° F.	5- 8% Cr	12-18% Cr.

The cost of expensive equipment is due mainly to labor and intricacy of design rather than weight of metal and hence higher chromium contents are justified for vessel linings, centrifugal pumps, bubble caps and trays, pump liners, wear rings, pump rods, connections to vessels, pipe-still bends, etc.

If hydrochloric acid corrosion is also present as in the vapor lines and condensing systems of sour crude-oil topping systems, the chromium steels may be unsatisfactory because of a pitting-type of attack.

5-STAR ECONOMY

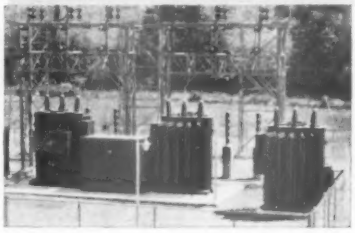
★ ★ ★ ★ ★ for Pipe-Line Stations

This compressor station near Berne, Ohio, is on Texas Eastern Transmission Corporation's new 791-mile, 30-inch gas line running from Mississippi to Pennsylvania. The four Allis-Chalmers forced-ventilated cage motors shown are rated 2500 hp, 3600 rpm each. A-C also supplied the unit substation shown below.

HERE'S an easy-to-take prescription for low-cost compressor or pump drives: Start with Allis-Chalmers enclosed forced-ventilated motors . . . then add a common ventilating system. That's all there is to it, but you get these five advantages:

- ★ The motors cost little more than open motors.
- ★ They need scarcely any attention because they operate in cool, clean air. (And the heated air can be discharged outside the motor room in summer and used for heating in winter.)
- ★ Protection for these hazardous locations is provided by supplying the ventilating air under pressure — during starting and during operation.
- ★ The motors are designed for the installation. They can, for example, be built for foundation, side or top air ducts.
- ★ Motor details are designed for easy installation and maintenance . . . plus longevity: Capsule-type housings permit access to motor interior without exposing bearings. Dual oil rings provide uniform, uninterrupted lubrication. Supplementary forced-feed oiling system on 3600-rpm motors is self-contained and air-cooled.

A-3879



Your A-C representative can help you decide where to use these modern pipe-line motors. Allis-Chalmers, Milwaukee 1, Wis.

ALLIS-CHALMERS

by Thomas M. Newell*

CORROSION CONTROL

How Inhibitors Prevent Corrosion in Oil Wells—4

EXPERIMENTAL results from Cardinal Chemical's experimental laboratories indicate that oil-soluble water-dispersible inhibitors are more efficient than water-soluble inhibitors.

Use of chemicals to make an oil-soluble inhibitor disperse in water generally results in a decrease of inhibitor efficiency. Suffice it to say that this is a result of the tendency of the dispersing chemical to keep the inhibitor in solution, rather than to permit a buildup of concentration at the fluid-steel interface. Also, the dispersing chemicals are costly, resulting in a further decrease in inhibition per dollar, for a manufacturer who operates on a small margin must either reduce the concentration of adsorbing molecules in his product to permit incorporation of dispersing chemical, or he must increase his price for this form.

There are applications where mechanical treating difficulties necessitate use of water dispersing agents. Unless this is the case, the more-efficient, less-costly oil-soluble product should be used. By "water dispersible" is meant stably dispersed so that separation of inhibitor and water will not occur for many hours.

Most polar inhibitor molecules possess the property of improving the wettability of oil to some extent. For that reason, most commercial inhibitors do not incorporate within themselves special wetting agents. The fact remains, however, that the most potent wetting agents are molecules which are structurally different from the best inhibitor molecules.

Each crude oil possesses its own unique wetting ability, and one composition of inhibitor cannot function equally well in wetting power in all crude oil-brine systems.

Special products must therefore be compounded for use in extreme areas, where standard inhibitors do not exhibit good wetting characteristics. An extensive study of oil-brine mixtures from many fields is now in progress. A portion of the special services of the laboratory should be wettability studies in new areas followed by a tailor-made inhibitor where necessary.

The future . . . The development of corrosion inhibitors is only beginning. The structural changes of molecules which may improve chemisorption are numerous; relatively untouched is the use of dispersants to remove corrosion products from already corroded steel surfaces in order that the adsorbing molecules can better reach bare steel; the development of tailor-made blends of wetting agents for optimum results in specific crude oils is in its earliest stages. Diligent, intensive research will see phenomenal improvements in the science of corrosion inhibition in the near future.

*Director of research, Cardinal Chemical Co.

Fig. 1, left, shows effect of corrosion in a well in Jordan pool, south of Pearsall, Tex. Fig. 2, right, is a photo of a coupon from the same well exposed for 6 weeks after commencing inhibitor treatment. Cardinal Chemical's Nocor inhibitor was used.

Lube-Oil Problem

Conditions . . . Corrosion was occurring in the drier section of phenol tower and near the outlet of furnace tubes in a lube-oil solvent-extraction unit. The drier operates at 260° F. and 5 psi.; furnace tubes at 520° F. and 35 psi. An extract mixture of phenol and oil is heated in the drier. Life of carbon-steel furnace tubes was approximately 3 years. However, the corrosion rate had increased recently due to changes in type of charges stock and increased throughput.

Remedial measures . . . The upper portion of the drier section was lined with 18-8 stainless steel strip and 18-8 tubes were installed near outlet of the extract solution furnace.

Results . . . The 18-8 stainless steel is giving good service with no appreciable corrosion loss.

Courtesy Gulf Oil Corp., Port Arthur, Tex.

To All Rotary Hose Purchasers:

BE SURE THE HOSE YOU BUY...

...CAN BE REPAIRED!

COUPLING—The original Barney Coupling is the only coupling that is stronger than the hose itself. It is the only coupling that can be reset to save your hose from the scrap heap.

CORD CONSTRUCTION—Goodall's flexible cord design provides the extra strength to withstand torsional twist . . . thus eliminating the cause of more than 90% of rotary hose failures.

FLEXIBILITY—Goodall Long-Life can be coiled into a convenient unit for transporting without slightest damage.

PERFECT BALANCE—The Goodall method of winding the multiple cords of the carcass and the steel cables of the pressure element at corresponding angles assures perfect balance.

GREATER STRENGTH—By actual test, Goodall Long-Life is the strongest hose ever built and it retains its strength better than any other hose.

REPAIR SERVICE—Goodall Rubber Company is the only rotary hose manufacturer that can protect your investment with a maintenance plan. Goodall maintenance provides a repair department in Houston where any length of Long-Life that meets with an accident can be renewed for the rest of its normal life. No length of Long-Life repaired in our shop has ever failed in service.

SALVAGE VALUE—Substantial allowances are made on every set of Barney couplings returned.

NO PREMIUM PRICE—The extra quality, longlife and high salvage value of Goodall Flexible Cord costs no more than ordinary rotary hose.

...and that means GOODALL LONG-LIFE with the Built-in Barney Coupling

There is no end to the service you can get from Goodall Long-Life Rotary Hose. First, maximum initial life is assured by the Goodall design which has proved the strongest, most flexible rotary hose ever built. But if your Goodall rotary hose should meet with an accident, the Barney Coupling can be reset to make your hose as good as new for the rest of its normal life. So . . . instead of being scrapped . . . your Goodall Rotary Hose can be back on your rig in a hurry for thousands of extra feet of tough drilling.

That's why we say to all Goodall Rotary Hose owners: NEVER DISCARD A GOODALL ROTARY HOSE UNTIL YOU CONTACT US. And that's why we suggest to all rotary hose users: BE SURE THE HOSE YOU BUY CAN BE REPAIRED. Thanks. Barney.

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

TRADE LITERATURE

1 BULLETIN 160-26 describes and illustrates centrifugal pumps for coolants and cutting oils, with numerous line drawings and photographs of typical installations on many types of machine tools. Various types of motor-mounting brackets, self-priming auxiliaries, and separate tank units are shown. Cutaway views and text show advantages of both seal and sealless types of centrifugal pumps. *Pioneer Pump & Manufacturing Co.*

2 ROTARY POSITIVE DISPLACEMENT METERS, a 16-page brochure, discusses meters for measuring gases of any type, in quantities from 4,000 to 1,000,000 cu. ft. In addition to detailed descriptions and illustrations of meters of various types, booklet contains useful selection table to determine meter required for any load, whether at standard or variable conditions of temperature and pressure. *Roots-Connersville Blower.*

3 TYGON PAINT. Bulletin No. 730 fully describes Tygon paint, and also gives information on Tygorust, the new "no-prep" vinyl primer. Bulletin tells where and where not; how, and how not to use this paint and primer. Comprehensive chemical-resistance charts, and an extensive chart on recommended primers and surface treatments are given. *The U. S. Stoneware Co.*

4 ALUMINUM HEAT-EXCHANGER TUBES. Contents of this 24-page multicolored booklet includes information on performance, fabrication, effect of cooling water, inhibitors, cathodic protection, applications, and fluid flow and heat-transfer characteristics. *Aluminum Co. of America.*

5 TYPE SEMPELL VALVES FOR CRUDE-OIL PROCESSING. This multicolored booklet discusses materials used for Sempell valves with corresponding diagrams, as well as three types of oil-processing valves. Pressure temperature charts and dimension and flange tables, are included. *Mannesmann Export GmbH.*

6 OIL AND GAS IN THE ROCKIES. This fact-filled brochure is a detailed analysis on oil and gas activities in the Rocky Mountain region, including an analysis of the "pays" in southeastern Idaho, southwestern Wyoming, northwestern Colorado, and parts of Utah. *J. A. Hogle & Co.*

7 SIMPLE RECORDER CONTROLLER. A 16-page illustrated bulletin describes the restyled Foxboro circular case controller. Showing typical applications, this bulletin discusses each unit of a pneumatic control system, from the measuring element to the control valve. A two-page data section analyzes four classes of measuring systems available for automatic temperature control, illustrating a variety of accessory equipment. *The Foxboro Co.*

8 WHAT YOU SHOULD KNOW ABOUT DIESEL ENGINES is an unusual and informative pocket-size

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Mar. 2, 1953

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OIL AND GAS EQUIPMENT Digest FROM CHECK IT

booklet on diesels, written in simple, nontechnical language, which effectively calls upon the grade-school primer technique for both telling and illustrating the diesel story. Its main objective is to show just how simple the modern diesel engine is and how easy it is to understand its operation. *P & H Diesel Div., Harnischfeger Corp.*

9 INDUSTRIAL TEMPERATURE MEASUREMENT AND CONTROL, a revised 24-page, 2-color manual, presents the basic principles of industrial temperature control in practical fashion. It defines different types of control systems and distinguishes among them so that the engineer can select the type most suited to a particular application. Typical control circuits and piping-system arrangements, as well as ranges and calibrations of scales and dials are presented diagrammatically. *The Partlow Corp.*

10 THE MODERN PIPE-LINE TRENCHER. This new four-page bulletin on the Cleveland Model 320 trencher contains many photographs presenting the 320 in action under all types of job and weather conditions. Text briefly outlines advantages and special design features. Complete dimensions and specifications, including a table of optional cutting widths, are shown. *Cleveland Trencher Co.*

11 BROWN B.T.U. METER is an instrumentation data sheet which describes the operation and application of this meter, which simultaneously records differential temperature and flow of a liquid, and provides direct reading of B.t.u. The instrumentation is applicable to heat-exchanger testing, and recording of thermal data of processes in pilot plants. *Brown Instruments Div., Minneapolis-Honeywell Regulator Co.*

12 EDWARD CAST STEEL VALVES. This 49-page catalog contains complete information on globe, angle, and check valves in 300, 600, 900, and 1,500-psi. pressure classes. In addition to standard data on construction features, dimensions, and weights, it discusses material specifications, and technical data required for valve selection. *Edward Valves, Inc.*

13 LESCHEN SLINGS AND FITTINGS is a new 64-page handbook containing more than 100 illustrations showing standard wire-rope, grommet, and multiple part slings. Charts show correct calculations for determining size of slings required, and correct sling angles in relation to loads. New line of Red-Strand eight-part braided slings is also featured. *A. Leschen & Sons Rope Co.*

14 TRANTEX POLYVINYL TAPE, a six-page folder, stresses the important advantages of Trantex tape as a pipe-line protection material. It illustrates and explains where and how this coating material can provide economies in specific field applications. Reference tables on properties, coverage data, and packaging are included. *Johns-Manville.*

15 PARSONS 250 TRENCHLINER, a new 16-page catalog, attractively printed and illustrated, describes in detail some of the exclusive Trenchliner features that provide greater production speeds and more versatile trenching operation. The 250, with maximum digging capacities of 12½ ft. deep and 16 to 42 in. wide, has a range of 30 digging feeds, three bucket-line and conveyor-belt speeds, and four travel speeds. *Parsons Co.*

16 THEORY AND APPLICATION OF THE FLOW TUBE, a 11-page technical bulletin by Vincent Gentile, Jr., gives hydraulic formulas, head capacity curves, and test data for this primary metering element. Also included is a table comparing performance of the flow tube vs. venturi. *Foster Engineering Co.*

17 NOW ALL-STEEL DODGE-TIMKEN PILLOW BLOCKS. This new colorfully illustrated bulletin gives a complete product description, including cutaway views, technical information and a selection chart of size ranges from 2-15/16 through 10 in. *Dodge Manufacturing Corp.*

18 I.L.C. ORIFICE METERS, an eight-page multicolored brochure, illustrates flow-meter assemblies with particular emphasis on chart drives, pressure pens, and pressure housing. Most engineering data are included. *Industrial Instrument Corp.*

FOR MORE INFORMATION.... use one of these cards

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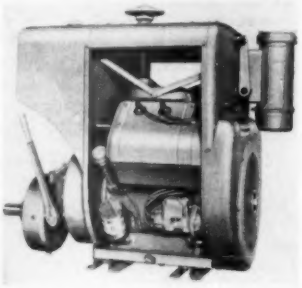
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

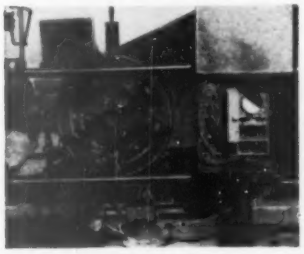
by Dan B. Miller

19 MODEL VG4D FOUR-CYCLE, V-TYPE, FOUR-CYLINDER ENGINE, develops a peak rating of 36 hp. at 2,200 r.p.m. It is a smooth-running, even-firing engine, well equipped to provide the extra margin of power needed for operating equipment within a 25 to 36-hp. range. Its light weight and compactness of design simplify the problem of engine installation on modern equipment where weight and space limitations are important factors. All of the traditional features found on Wisconsin engines are a part of the new VG4D, including tapered roller main bearings, dynamically balanced forged crankshaft, mirror finish on crank pins, stellite-faced exhaust valves, valve-seat inserts, and honed cylinders. Efficient, positive cooling is obtained even at extremely high temperatures from a large fan cast in the flywheel which forces a strong blast of air across and around the cylinders and heads. *Wisconsin Motor Corp.*



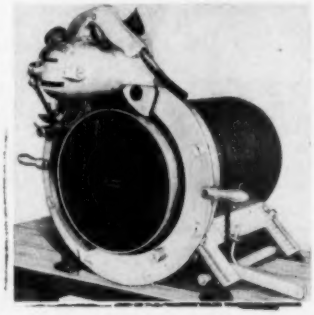
IT'S NEW CHECK IT

20 SHURWAY AUTOMATIC STARTER. A full automatic starting and stopping control is recommended especially for pumping wells with high lift cost. These units assure starting of internal - combustion engines without the aid of operators. They stop the engine after the running cycle has been completed and repeat the same operations every 24 hours. The running and shutdown periods can be any length of time from 15 minutes to 23 hours and 45 minutes. It is simple in construction yet made of durable material that will withstand rugged continuous operation in normal conditions. These starters made possible the operation of oil-field pumping units in a manner that can increase production by pumping several short periods during each 24 hours without the cost of keeping an operator at each well. *Tulsa Engineering Sales Co.*



IT'S NEW CHECK IT

21 SUPERSPEED POWER CUTOFF SAW. This saw is now available in two models for cutting ½-in. tubing through 12-in. pipe. One model cuts from ½ through 6-in. and the other from ½ through 12-in. The saw, using abrasive cutting wheels, is designed for quick, accurate cutting of pipe and tubing of aluminum, copper, stainless steel, and other metals, in varying wall thicknesses. It cuts clearly, giving a square nondistorted surface without misalignment or burns. The saw uses 110-volt alternating current and is simple to operate—no extra skill or experience is needed. The saw has a free-moving, rotating ring which encompasses the pipe or tubing being cut. The saw is attached to the frame so that the saw and frame rotate together. The portability of the saw and its light weight make it useful for shop use as well as field fabricating. The unit is easily secured to any bench and quickly adjusted for any size tubing or pipe up to and including 12 in. *Tri-Clover Machine Co.*



IT'S NEW CHECK IT

22 NEW DIFFERENTIAL PRESSURE PRIMARY ELEMENT TRANSMITTER for use in automatic control systems known as the Type D2T Autronic differ-

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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ential pressure transmitter, is used in conjunction with the Autronic control system and covers a differential-pressure range of 0-20 to 0-200 in. water at static pressures up to 1,500 psig. Installed at the point of measurement, the unit transmits an electric signal which is directly proportional to the variable being measured. Since the system is all-electronic, eliminating electric motors, slide wires, and other contacting mechanisms, response is instantaneous. The unit has a corrosion-resistant stainless-steel diaphragm. Minute movements of the diaphragm are transmitted through a friction-free amplifying linkage to the movable core of the differential transformer which provides the 0.000 to 0.500-volt 60 cycle a.-c. signal output required for operation of other units in the system. The unit incorporates a spring for zero adjustment, a linkage-ratio adjustment for coarse span, and an electrical adjustment for fine span which does not affect the zero adjustment. *The Swartwout Co.*

IT'S NEW CHECK IT

23 MODEL R CONSTANT SUPPORT HANGERS. An exclusive feature of their design permits 10 per cent increase or 10 per cent decrease in their load by field adjustment of a single bolt, without impairing their constancy. This new design results in hangers which are smaller in size for the loads carried. Less head room is required and hangers can be bolted directly to the building structure. Frames are drilled for either single or double rod suspension. Three regular frame sizes providing maximum travels of 4, 8, and 12. in. will take care of all loads from 48 to 9,304 lb. Model R hangers are nonresonant and in combination with the use of antifriction needle bearings, friction has been reduced to a minimum. The new design provides favorably small ratios between spring force and the supported load ranging from 1.15 to 1 minimum and 4 to 1 maximum, thereby minimizing bearing stress and prolonging the life of the hanger. *Grinnell Company, Inc.*

IT'S NEW CHECK IT

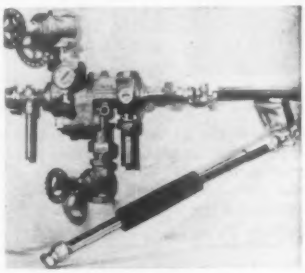
24 NEW 30-TON LORAIN MOTOR CRANE. A 30-ton-lifting-capacity machine is now available in both the Moto-Crane and self-propelled models. The Moto-Crane consists of a 30-ton-capacity turntable mounted on an automotive-type three-axle carrier having 10 speeds forward and 2 reverse. It can travel over the highway at speeds up to 30 m.p.h. and has double rear-axle bogies and the tractive effort to enable it to travel over soft ground and rough terrain. Both gasoline and diesel power plants are available. Carrier is available with two rear driving axles only or with the addition of a front driving axle. Air brakes, air-assist steering, and all the accessories for highway operation are standard equipment. The MC-524 is convertible to shovel, crane, clam shell, dragline, or hoe. It is rated in the 1-cu.-yd. class as a shovel. The self-propelled model, build for more limited travel needs, consists of the same basic 30-ton turntable mounted on a three-axle carrier that is propelled by the turntable engine which may be either gasoline or diesel. Drive is on two rear axles only. There are four speeds in both directions with a top travel speed of 7½ m.p.h. Air brakes and full air steering are operated from turntable cab. The SP-524 is available as a crane and dragline only. *The Thew Shovel Co.*

IT'S NEW CHECK IT

25 NEW CABLE FOR SONOFLUX. A new 50-ft. cable is now available for the Sonoflux magnetic inspection instrument. This long cable greatly simplifies the problem of inspecting flanges, tubing, vessel plate and welds, furnace castings, cooling-tower fan hubs, and towers in place in refineries and chemical plants. The Sonoflux unit remains on the ground, while the operator need carry only the Sono-Probe to make inspection. The Sonoflux operator on ladder or cat walk, equipped with this cable and Sono-Probe can do the same quality inspection as was formerly done by hoisting an entire inspection unit on a crane. Sonoflux magnetic-particle inspection instrument is lightweight and low cost. *Sonoflux Corp.*

IT'S NEW CHECK IT

26 SELLERS BOOSTER JET now makes available to plants with low-pressure-steam facilities, the advantages of the hydraulic jet cleaning method. This is a means of propelling a solid jet of high-pressured hot water and detergent for all heavy-duty cleaning. The booster jet is designed to operate on ordinary cold water and plant steam of from 5 to 25 psi. and makes it possible to convert 5-psi. inlet steam pressure to 100-psi. discharge pressure. The in-



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product filters

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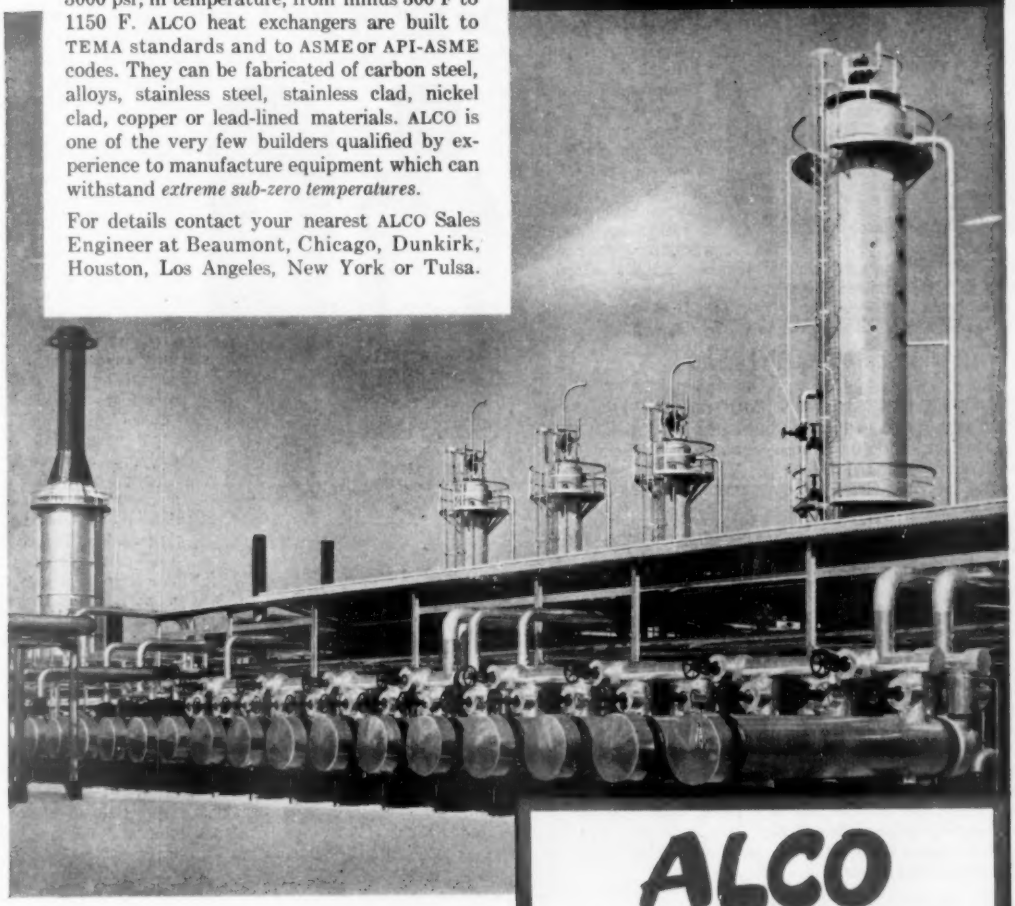


ALCO

ALCO PRODUCTS DIVISION
AMERICAN LOCOMOTIVE COMPANY
Dunkirk, N. Y.

crease ranges proportionally to 200-psi. discharge pressure resulting from 25-psi. inlet steam. A solid stream of hot water, containing detergent up to 25 per cent of the total volume, with temperatures of 160° to 210°, under pressure of 100 to 200 psi. is propelled with controlled force. The resulting impact completely removes all dirt, grease, and stubborn matter from walls, floors, and equipment. Length of the jet is manually controlled to extend as far as 30 ft. from the discharge nozzle. *Sellers Injector Corp.*

IT'S NEW CHECK IT

27 OTTAWA HEAVY-DUTY BACKHOE is ruggedly built to dig trenches or ditches, lay light pipe, excavate, or backfill with blade attachment. It is equipped with leveling jacks, operating jacks, a powerful hydraulic pump, and control valve bank. This equipment will dig trenches from 12 to 36 in. wide to a depth of 8½ ft. The boom will swing through an arc of 130° and the equipment will level on a 15° slope. Maximum reach for digging is 15 ft. 4 in. It is designed for use with International Harvester tractor models I-4, ID-6, I-9, IL-9, W-6, WD-6 W-9, and WD-9. *Ottawa Steel Products, Inc.*

IT'S NEW CHECK IT

28 NEW INK GOES ON SMOOTH PLASTIC FILM. The picture illustrates the use of a new carbon drawing ink on (left) cellulose acetate film, (center) a glass plate, and (upper right) on the smooth side of a photoelectric engraving plate made of cellulose nitrate. Adhesion to many materials, wear resistance, heat resistance, extreme opacity, nonclogging quality in fine-bore lettering pens, and ability to be frozen and thawed without harm, are qualities of the ink. It is stable enough to be used in some fountain pens. The new ink combines with the other qualities fast drying (2 minutes), and very strong adhesion to plastics, with no tendency to flake. It does not etch plastic film, and can be removed by using a damp cloth. It can be tempered and rendered water resistant by the use of a hair dryer. *Electrochemical Laboratories.*

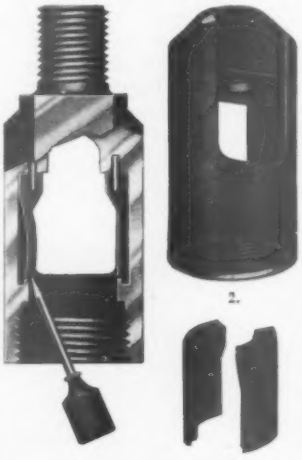
IT'S NEW CHECK IT

29 SLIDE SEAL COUPLING permits instant connection and disconnection of fluid-carrying lines by means of a simple push-pull action. Consisting of two simple two-piece die-cast aluminum assemblies with rubber O-rings, the Slide Seal coupling is extremely lightweight and compact. A spring-actuated locking device holds each half of the coupling in the coupled position which permits

full flow of fluids. Pressing the lock lever separates the coupling halves and starts the disconnecting action which is completed by a light pull. When fully disconnected, each half of the coupling forms a perfect seal. Reconnection of the two halves is quick and positive, and may be accomplished without actuating lock lever. *Aeroquip Corp.*

IT'S NEW CHECK IT

30 IMPROVED RUBBER GUIDE CAGES. The Hycar rubber ball guides, which have very long life, are now easily replaceable, as shown in the cutaway illustration of open-type top cage. These resilient guides cannot "beat out" and they stand sand abrasion better than any metal. Considerable improvement may also be expected in ball and seat life. Made in all sizes from 1 to 4¾ in. in open and closed types and in all styles. Closed-type cages (not illustrated) are designed with stainless-steel retainer band which holds the upper portion of rubber guides in place. The top portion of the closed-type guide is shaped to fit under the retainer, and the lower portion fits into the back groove like that shown in the open-type illustration. *John N. Martin.*



1. Top cage showing installation of guides: (2) Lower cage; (3) Pair of guides with single hole in top.

IT'S NEW CHECK IT

31 NEW ONE-MAN FIRE ENGINE contains quick-acting, fire-killing Alfco dry chemical. It is a dry chemical wheeled engine, with a capacity of 150 lb. The new Model 150 is only 480 lb. in weight, fully charged and can be easily wheeled, maneuvered, and operated by one man. The density of the dispersion of its sustained pressurized discharge has the effect of cooling and insulating the operator from the intense heat of the fire. Aided by an excellent discharge range of from 20 to 25 ft., this cooling effect on the operator enables him to move up quickly on the fire and blast it out with the full force of the smothering chemical. The expellent is dry nitrogen, with a sustained operating pressure of 200 psi. during the entire period of discharge. All the contents can be discharged in about 45 seconds, if necessary. *American-LaFrance-Foamite Corp.*

PIPE LINES

Contract Let on Evangeline Products' 16-In. System

HOUSTON.—Panama-Williams Co. has been awarded contract to construct a 16-in. refined-products pipe line between Port Arthur, Tex., and Baton Rouge, La.

Work on the line, to be known as Evangeline Products System, is scheduled to begin around April 1. It will be 194 miles long, and will transport gasoline, kerosine and fuel oil. Initial capacity will be 96,000 bbl. per day.

Owners of the system on an undivided-interest basis, will be: Texas Pipe Line Co., 40 per cent; Gulf Refining Co., 40 per cent; and Sinclair Pipe Line Co., 20 per cent. Texas Pipe Line will have charge of construction.

Wolverine Line Will Be Operating in January 1954

NEW YORK.—Wolverine Pipe Line Co. has announced that its 16-in. oil-products pipe line from East Chicago, Ind., to Detroit is scheduled for completion January 1, 1954. Estimated cost is $15,450,000.

The line, which also will have a link to Toledo, will have an initial capacity of 95,000 bbl. daily and an ultimate capacity, with additional pumping stations, of 170,000 bbl. It will operate as a common carrier.

Wolverine is owned 40 per cent by Shell Oil Co., 35 per cent by Cities Service Oil Co., and 25 per cent by The Texas Co.

Fulton Gets Contract for Platte Line in Wyoming

KANSAS CITY.—Platte Pipe Line Co. has awarded a contract to R. H. Fulton & Co., Lubbock, Tex., for laying $3,000,000 of 12-in. and 14-in. pipe line in Wyoming.

This 92-mile extension will permit Platte to serve directly the Byron and Oregon areas of Wyoming's Big Horn basin. The Platte line now extends westward only as far as the company's Chatham Station, which is 17 miles southwest of Worland, Wyo.

Platte recently put into operation its new $60,000,000, 20-in. crude-oil pipe line, which is capable of transporting over 100,000 bbl. of oil daily from the Rocky Mountains to Wood River, Ill. There deliveries are made to refineries

Loop Line Gets Wrapping

A wrapping machine proceeds along the new 26-in. loop line of Texas Gas Transmission Corp. Construction of 408 miles of 26-in. loops along the company's main line from Bastrop, La., to Owensboro, Ky., was begun last year. About 30,000 tons of 26-in. pipe was transported from McKeesport, Pa., to construction spreads, via the Mississippi and Ohio rivers.

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for the finest in Water Cans and Coolers!

Be sure to get the best . . . be sure to say "IGLOO" when you buy a water can or cooler. Your supply store has them in 1½, 3, 5 and 10 gallon sizes.

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EXPANSIBLE CLEANERS
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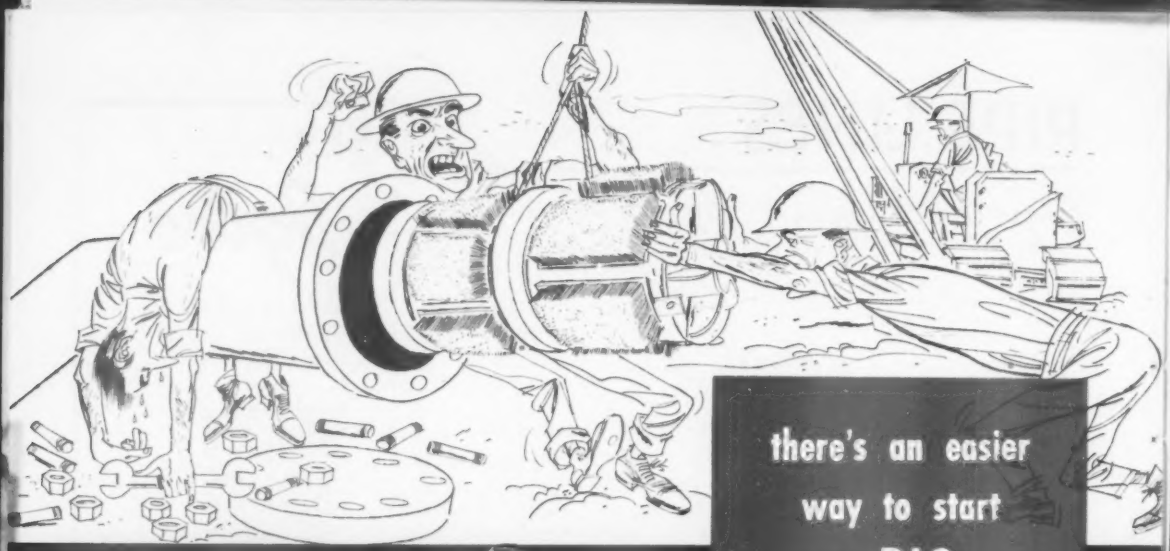
(WRITE FOR CATALOG)



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UNIBOLT scraper trap

makes line pressure do the hard work!

with oversize barrel

An oversize barrel on the sending and receiving ends of a line, slightly larger than the diameter of the pig, makes it easy to send or catch a scraper. Line pressure does the heavy work. But to make the job doubly simple and easy, you need UNIBOLT Hinged Scraper Traps. To open them, all you need do is release two bolts and the blanking plug swings open like a door. No heavy lifting. Nothing to fall on workmen. No time-consuming blind flanges to break out and make up. No danger of leaks. A self-sealing resilient ring assures a pressure-tight closure.

Wherever multi-bolt flanged couplings and closures are now being used . . . on strainers, scrubbers, mist removers, terminal manifolds, blowdowns or other pressure vessels . . . UNIBOLT Couplings will serve you better.

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PIPE SADDLES AND REDUCERS

Nozzle sizes from 1/4" to 24"

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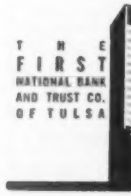

THE FIRST NATIONAL BANK AND TRUST CO. OF TULSA

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in the St. Louis area and to other pipe lines for transportation farther East.

Platte is owned by British-American Oil Producing Co., Sinclair Oil & Gas Co., Continental Oil Co., Pure Oil Co., and Ohio Oil Co.

The extensions to be built by Fulton are scheduled for completion June 30. They include: Chatham, Wyo., to Oregon basin, 52 miles of 14-in., and Oregon basin to Bryon-Garland field, 40 miles of 12-in. line.

Platte's system now totals 1,058 miles of crude-oil trunk line. It was completed in 1952.

Line Pipe Allocated for Kaneb's 236-Mile Carrier

WASHINGTON.—Line pipe for the construction by Kaneb Pipe Line Co. of a 236-mile 8-in. products pipe line from Wichita and Potwin, Kans., to Fairmont, Nebr., has been alloted by the Petroleum Administration for Defense.

The line, which will have five pumping stations, is planned for an initial capacity of 15,000 bbl. daily and an ultimate capacity of 23,000 bbl. daily and has an estimated cost of $8,200,000.

The total requirement for pipe is 15,000 tons, and PAD has allotted 5,000 tons for the current quarter and corresponding amounts for the second and third quarter. The company is aiming at a completion date of September 1.

Tennessee Gas Asks FPC For O.K. to Build Facilities

HOUSTON.—Tennessee Gas Transmission Co. is seeking Federal Power Commission authority to build $91,718,000 worth of facilities to permit the company to transport gas to New York state for Iroquois Gas Corp. of Buffalo, and Niagara Gas Transmission, Ltd., of Toronto, Ont. The gas would be purchased by Iroquois and Niagara in Texas and Louisiana.

Proposed facilities include: A 30-in. 574-mile pipe line from Kinder, La., northeast through Louisiana, Mississippi, and Tennessee which would join Tennessee's present system at Portland, Tenn.; about 130 miles of loop line in Texas, Louisiana, Ohio, and Pennsylvania.; a 45-mile, 20-in. spur line from near Buffalo to a point on the United States-Canadian Border near St. Catharines; a submerged crossing of the Niagara River; an additional 158 miles of lateral pipe lines in Louisiana and Texas; and an additional 17,520 hp. at existing compressor stations.

The firm also would build three new compressor stations, with 21,280 hp.,

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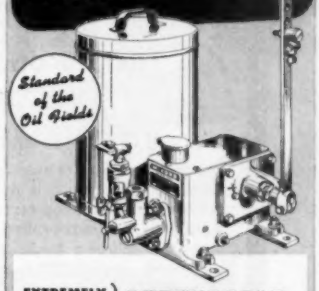
TYPE "C" CHEMICAL MEASURING PUMP



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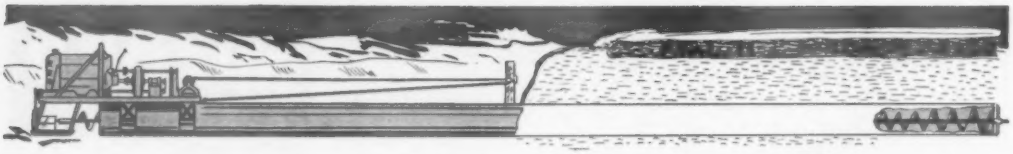

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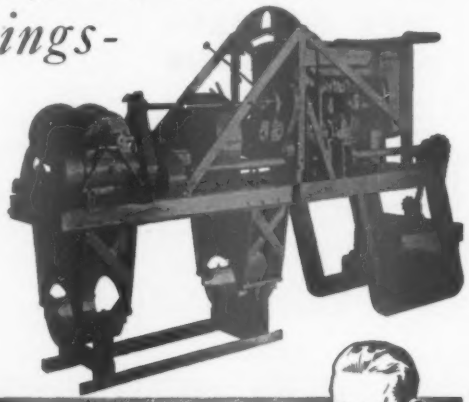

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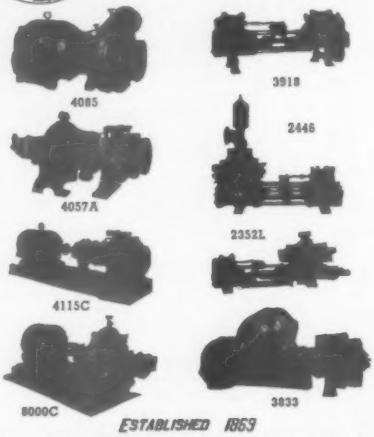

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- Compact self-contained unit—simple design—few working parts.
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- Ball bearing supported one piece magnetic rotor.

An explosion-proof Super Spark Magneto is also available.

Change now to Fairbanks-Morse Super Spark Magnetos for peak performance and endurance. See your Fairbanks-Morse service station or distributer or write Fairbanks, Morse & Co., Magneto Division, Beloit, Wisconsin.

FAIRBANKS-MORSE

A name worth remembering

MAGNETOS ZC ENGINES MOTORS PUMPS DIESELS

near Yazoo City, Miss., Morehead, Ky., and Findley Lake, N. Y.

Oklahoma Natural Prepares For Chouteau 18-in. Line

TULSA.—Work will start in the last half of March for the $2,250,000 51-mile, 18-in. line to be built by Oklahoma Natural Gas Co. from Sapulpa to Chouteau, Okla., in the vicinity of Pryor. Construction will be contracted before March 15, for completion of the project within 60 days after it is started.

All of the pipe for the project has been delivered by A. O. Smith Corp. At highway crossings pipe wall thickness will be ⅜-in.; main-line pipe wall thickness will be ¼-in. Pipe will be coated with coal tar enamel wrapped with glass mat. It will be buried with 30-in. of cover.

Capacity will be 75,000,000 cu. ft. daily. So far it is reported that sale has been contracted for only a small percentage of this capacity. Deere & Co., one of the customers, is scheduled to utilize gas as raw material in the manufacture of fertilizer ingredients. Grand River Dam Authority will use gas as fuel for its standby steam plant which is operated during periods of low water.

Rancho Line Taking Oil

McCAMEY, Tex.—Crude oil has been pumped into the new Rancho Pipe Line System at McCamey, Tex., during the last half of February to fill a 160-mile section extending to the Llano River.

A 45-mile section in the vicinity of Austin was being tested during the last part of February to prepare for pumping about March 1. Initial pumping operations in the Austin area would be handled by Shell Pipe Line Corp.'s Baylor Station located on Shell's existing 10-in. line near the Rancho System.

It is expected that deliveries will start for Rancho in the Houston area about the middle of March unless there are unforeseen delays.

Interstate Lets Contract

SHREVEPORT.—Interstate Oil Pipe Line Co. has let contract to Delta Pipe Line Construction Co., Cushing, Okla., for construction of 14 miles of 8-in. crude-oil trunk line in Caddo and Bossier parishes, Louisiana.

The new line will connect with Interstate's Ida-Moore Station trunk line 3 miles south of Dixie, La., and extend southeast to a connection with the existing Weller-Moore Station line, 6 miles east of Bossier City, La.

new Willson

BRONZE

safety spectacles

combining ***eye protection*** *with the* ***color styling*** *workers want today!*

Style WB—choice of new spatula temples as shown, or half-plastic, half-cable type temples. Style WBS—has matching bronze sideshields.

Not one, but *two* new features make these sturdy safety spectacles an exceptional value. Their distinctive bronze color gives them a pleasing appearance. And the new non-flammable frame is toughest plastic made for spectacles—won't chip, crack or craze—and has greatest shock resistance.

Willson Bronze styles feature the "keyhole" bridge and popular Hi-Line® temple. Brand-new wire core spatula temples add an extra comfort feature you'll welcome. They're easy to adjust for a perfect fit!

These attractive spectacles are available with Super-Tough® heat treated glass lenses or Willson Plas-Tough™ plastic lenses. A full range of eye and bridge sizes make these spectacles ideal for use with prescription lenses. See your nearest Willson distributor for these new Willson Bronze styles—or write for descriptive bulletin.

For those who prefer flesh-colored plastic spectacles, with the same safety and comfort features and choice of temples, see Style WK and Style WKS.

More than 300 Safety Products *Carry This Famous Trademark*

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SIZE 12¼"

1 Bodies of high-grade alloy-steel. All-forged bodies (in sizes from 7½" to 12½")

2 Bodies heat-treated for maximum strength.

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5 Precision-machine finishing.

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Among the Drilling Contractors

Tyler Contractor Sends Drilling Crews to Spain

Delta Gulf Drilling Co., Tyler, Tex., has sent 25 drilling crewmen to Spain to drill the first of several proposed tests in an area 150 miles northeast of Madrid.

Morris E. Hays, Odessa, Tex., supervisor for Delta Gulf, has been in Spain for more than a month making arrangements to drill the first wildcat, which will be projected to 12,000 ft.

The program is being financed 50 per cent by the Spanish government and 50 per cent by an American group which includes General American Oil Co. of Texas, Delhi Oil Co. and DeGolyer & MacNaughton, all of Dallas; Delta Gulf Drilling Co., Tyler, and others. Delta Gulf has drilling contract.

Location for the tests is in the Logrono province, in the Ebro Valley country.

Denver Contractors Pick Dunbar for Chapter Head

The newly formed Denver chapter of the American Association of Oilwell Drilling Contractors has elected J. V. Dunbar, owner of Dunbar Drilling Co., Salem, Ill., as its first chairman. Dunbar's company, now active in the Rocky Mountain region, has been one of leading contractors and operators in the tri-state area of Illinois, Indiana, and western Kentucky.

Other officers of the new chapter are: R. L. Manning, president of R. L. Manning Co., Denver, vice chairman; and Will I. Lewis, Jr., Will I. Lewis Drilling Co., Mount Vernon, Ill., and Denver. Lewis also is a leading tri-state area contractor and operator who has moved in on the Rocky Mountain development.

Robinson Drilling Co., Salt Lake City, Utah, has a contract for a projected 3,600-ft. test which Last Frontier Oil Co., Inc., of Reno, Nev., is starting in the Osage area, Elko County, Nevada. Location is in the E½ NW 23-31n-69e.

Delaney Drilling Co., Tulsa, has the contract for a 6,000-ft. test being started by Patrick A. Doheny of Dallas in northeastern Pontotoc County. The test, 1-A Busby, located in the SW SW NW 12-4n-8e, is near a 6,200-ft. Arbuckle test, drilled in 1950, that got substantial showings in the Bromide, Viola, and Hunton horizons. A 1,500-ft. cable-tool test is being started in the same area by the same operator with X-Ray Oil Co. as the contractor.

Allen & Morris San Antonio

ALLEN & MORRIS, organized in 1921, is one of the older, established drilling contracting partnership firms in South Texas. Starting at Laredo, Tex., on the Mexican border,

J. S. MORRIS

W. C. MORRIS

in the early days of shallow sand development in that part of the state, the firm since has moved its headquarters to San Antonio with operations extending over the entire southwestern Texas and lower Gulf Coast regions. It also maintains a district office at Corpus Christi for the lower coastal area. San Antonio headquarters are in the Alamo National building. Corpus Christi offices are at 1201 South Port Avenue.

Personnel . . . Present partners in the ownership are Joseph S. Morris and Will Crews Morris. The former serves as general manager, and the latter as assistant. He is a past president of the American Association of Oilwell Drilling Contractors. Marvin W. Rogers is office manager; Jack A. Bone, petroleum engineer; and Charles D. Bryant, headquartering at Corpus Christi, field superintendent. Tool pushers include Coy Pyle, Travis A. Williams, Cleo

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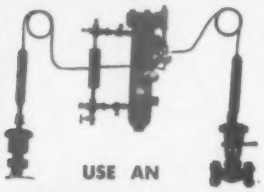

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THE CHARLES MACHINE WORKS
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Ray, Paul Waldrop, Oscar H. Griffin, and C. Hubert Newbury.

Equipment . . . The firm currently is operating four steam and two mechanical-power rotary rigs. One steam rig, now working for La Gloria Corp. in the Selligson field, Jim Wells County, has a Model 34-10-FE, 1,600-hp. draw works with a 14-in. by 14-in. engine. Another, drilling for Taylor Oil & Gas Co. in the Weslaco field, Hidalgo County, has a Model 11, 1,200-hp. draw works with 12-in. by 12-in engine. The third, running for Humble Oil & Refining Co. in the Cannan field, Bee County, uses a Model H-46-M, 1,200-hp. draw works with a 12-in. by 12-in. engine. The fourth employs a Model UB-54 draw works with 14-in. by 14-in. engine.

Power rigs include a Model 75 draw works assembly having a Model 6-71 engine, a C-350 7¾-in. by 18-in. pump, and a C-250 7¾-in. by 15-in. pump, and provided with a 129-ft. derrick on a 10½-ft. substructure; and a Model 50 draw works assembly with a 6-MK engine, a 7¼-in. by 15-in. C-250 pump, an 8-PHD pump, and a 131-ft. derrick on a 10½-ft. substructure. Both are under contract to Humble Oil & Refining Co., the former in the Flour Bluff field, Nueces County, and the latter in Ramirena field, Live Oak County.

Performance . . . The firm's rigs cut a total of 360,652 ft. of hole during 1952. The firm's deepest hole, started in 1951 and completed in 1952, was carried to 14,110 ft. It was drilled for Hiawatha Oil & Gas Co. in the Sweden field, in Duval County.

Loe Pipe Yard has taken a contract for a Nacatoch-sand test which R. W. Rhodes and associates will drill 1¾ miles west of the Truxno field, in Union Parish, northern Louisiana. Location is for 1 Futch, in 23-23n-1w.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 2-23-53	Change week ended 2-16-53	Change week ended 2-25-52
Gulf Coast	584	−10	− 5
N. & W. Tex.-N. M.	793	+ 1	−244
Ark.-N. La.-E. Tex.	114	− 9	− 44
Oklahoma	317	+ 8	− 19
Kans.-S. Neb.	168	+ 2	− 1
Illinois-Eastern	103	+ 5	+ 20
Rocky Mountains	185	−10	+ 28
Pacific Coast	162	− 7	− 11
Total U. S.	2,426	−20	−274
Western Canada	156	− 6	− 23
Total	2,582	−26	−297

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Pacific Coast and Illinois-Eastern areas are shown on pages 140 and 141.

Noble Drilling Co., Tulsa, has a new deep wildcat test under way for McAlester Fuel Co. in Cleveland County, Oklahoma. Location of the test, 1-A Todd, is in the C NW SW 11-9n-3w, 3 miles northwest of Norman. Hole is projected to 10,350 ft. for a look at the lower Simpson sands.

Kemp Drilling Co., Shreveport, is starting another well, the second, for Magnolia Petroleum Co. in the new Rifle Point field, in Concordia Parish, Louisiana. The new operation is a north offset to the discovery well. It is projected to 6,900 ft. to confirm the discovery well's Wilcox pay.

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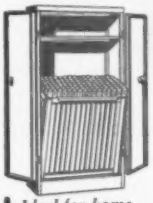

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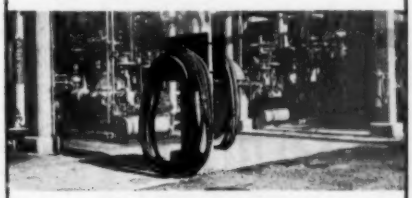

U. S. Matchless® Steam Hose on a typical hose rack in a refinery.

Here are but a few examples of the many installations where "U. S." hose is working daily on the docks and throughout the entire refinery. You'll find it transporting oil, gasoline, washing down, thawing out, dissipating volatile gases. You'll find it ready to fight fires and perform many other special jobs... in fact, there is a "U. S." hose for every refinery need. Refinery men know that United States Rubber Company hose always exceeds the standards of safety boards and protective statutes. For complete hose information, write to address below.

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Dowell Service removed all traces of oil after mechanical cleaning method failed

Can you imagine cleaning out oil storage tanks so well that they could be used to store a product such as alcohol, which is so easily discolored by oil and grease?

That's exactly what Dowell did for a customer who wanted to convert three 350,000 gallon tanks from oil to alcohol storage.

Previous attempts to clean the tanks by sand blasting had not been satisfactory. And there was particular difficulty in cleaning behind the overlapping plates of one riveted tank.

Dowell Service did the job in about 10 hours per tank with this result: *the tanks were completely free from oil and grease.* Dowell furnished all trained personnel, chemical solvents, high pressure jets, pump trucks and controls.

Tank cleaning, including removal of paint from external surfaces, is just one of hundreds of applications for Dowell Service using chemicals for maintenance cleaning. For complete information and estimates on the cleaning of your equipment, call the nearest Dowell office, or write directly to Tulsa, Dept. C11.

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REFINING

Ohio Expansion

Firm reducing resid yield at Robinson, Ill., plant

ROBINSON, Ill.—With the current refinery construction program here Ohio Oil Co. will be able to boost crude-charging capacity from 31,600 to 40,000 bbl. per day, at the same time increasing the yields of gasoline and distillate fuels at the expense of residuals.

The company's plans were outlined recently by J. C. Donnell II, Ohio president, before the New York Society of Security Analysts.

The existing fluid catalytic cracking unit at Robinson is being expanded from 12,400 to 18,800 bbl. per day. Polymerization production will be boosted from 3,800 to 4,800 bbl. per day and a new delayed coking unit will charge 6,000 bbl. per day of heavy residual stock to produce 240 tons of petroleum coke daily.

This, in conjunction with the other expanded facilities will reduce the refinery's residuals, gas and loss from the present 23 per cent to 5 per cent based on crude charge, Donnell said. At the same time, it will boost gasoline yield from 56 per cent to about 72 per cent and middle distillates from 21 per cent to 23 per cent of crude charged.

New Houdriformer . . . The company is also installing an 8,000 bbl. per day Houdriformer to improve its octane position, and is negotiating with the Government for the construction of a 1,500 bbl. per day alkylation unit as a contribution to the defense effort.

Robinson charged an average of 34,023 bbl. per day last year as compared with 31,628 bbl. per day in 1951.

Lovell plant output off . . . The company's refinery at Lovell, Wyo., showed a decline in crude runs last year, from 4,802 bbl. per day in 1951 to 3,612 bbl. per day in 1952. This reduction, Donnell said, reflected the poorer market for residual fuel oil which has apparently become chronic in the nation's interior. At present Lovell's operation is directed toward producing asphalt and road oil.

Esso Budgets Big Refinery Modernization Program

NEW YORK.—Esso Standard Oil Co. plans to spend $86,000,000 this year for new equipment in its six refineries located at Everett, Mass., Linden and Bayonne, N. J., Baltimore, Md., Charleston, S. C., and Baton Rouge, La. The main objective will be to improve operating efficiency; little increase in crude processing capacity will result.

Although authorized for expenditure this year, most of the planned projects will not be on stream until 1955. New facilities will in many cases replace outmoded units to lower operating costs, provide higher product quality, and reduce the yield of lower-valued residual products.

Included in Esso's plans are some units which will employ entirely new processes developed by Standard Oil Development Co. These include catalytic reforming, fluid coking, and hydrofining. The latter process will be used in a 20,000 bbl. per day unit at Bayway, for the mild hydrogenation of cracked naphthas and No. 2 burning oil. Announcement of other units will await further process development and economic studies.

New Heat-Exchange Book Is Issued by Institute

NEW YORK.—"Standards for Steam Surface Condensers," a 20-page book, has just been released by the Heat Exchange Institute. This third revision of editions which were introduced in 1939 and 1940 is completely rewritten, with clarified definitions and new material on heat-transfer rates.

The data on heat-transfer rates is included to fill the need for establishing rates which are possible of attainment under commercial operating conditions with efficiently designed condensors. The institute has conducted extensive tests at Lehigh University for the purpose of arriving at values which would represent maximum safe design limits.

The new data reflect the results of these tests and include corrections in heat transfer for different tube materials. Performance curves have been included to illustrate more nearly actual maximum performance.

A new section of recommended sizes is included and the recommended vacuum-pump capacities have been revised and recommended capacities for rapid evacuation are listed.

The new book is one of a series of eight separate publications on different pieces of heat exchange apparatus. It is obtainable at $2.00 per copy within

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More Lube Oils Going to Automatic Transmissions

NEW YORK.—Last year, over 47 per cent of all passenger cars produced in this country were equipped with automatic transmissions or semiautomatic torque converters. The number of units to be so equipped this year is expected to be well over half the country's production. This growing acceptance of automatic transmissions represents a small added increment in the domestic demand for lubricating oils.

In the Chrysler family, the fluid drive and the fluid-torque take S.A.E. 10 motor oil for the first 500 miles, and S.A.E. 20 motor oil thereafter. For all fully automatic transmissions, such as the Hydromatic, Studebaker, Fordomatic, Mercomatic, Ultramatic, Dynaflow, and Powerglide, manufacturers recommend the use of Automatic Transmission Fluid, Type-A, which has a minimum and maximum viscosity of 54 and 56 S.S.U. at 210° F. and a viscosity index of 150 minimum.

Classifications Revised by S.A.E. for Lubricants

NEW YORK.—The Society of Automotive Engineers has announced two important developments with respect to lubricants. Revised copy for "S.A.E. General Information Report on Crankcase Oil Types" has been prepared, based on the new A.P.I. Service Classification System.

In addition, the S.A.E. Transmission and Axle Lubricant Classification has been revised to base it on viscosity only. Under the new conditions, proper performance qualities for the service recommended, including low-temperature characteristics, are the responsibility of the lubricants supplier.

Both of these revisions will appear in the 1953 edition of the S.A.E. Handbook. They are the work of the S.A.E. Fuels and Lubricants technical committee.

M. D. Gjerde of Standard Oil Co. (Ind.), was reelected chairman at the recent meeting in Detroit. Victor G. Raviolo, Ford Motor Co., is vice chairman. Other members of the executive committee are: Walter G. Ainsley, Sinclair Refining Co.; John M. Campbell, General Motors Research Division; A. Ludlow Clayden, Sun Oil Co.; Carl W. Georgi, Quaker State Refining Co., and R. P. Lewis, Spicer Mfg. Division, Dana Corp.

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NATURAL GAS

P.L.S. to Spend $56,000,000 For New Gas Facilities

LOS ANGELES.—Anticipated growth of Pacific Lighting System in 1953 will require estimated capital expenditures totaling approximately $56,000,000, according to Robert W. Miller, president of Pacific Lighting Corp.

"This is the largest capital budget in the history of the system," Miller declared, "and it marks the seventh consecutive year that an annual investment in excess of $35,000,000 has been required to keep abreast of the continuing development in Southern California."

"In the last 6 years," he said, "more than $200,000,000 has been invested in additions, betterments, and replacements to the gas supply system which is comprised of Southern California Gas Co., Southern Counties Gas Co., and Pacific Lighting Gas Supply Co."

Included in this year's consolidated budget for the three subsidiaries is $16,000,000 which will be devoted to the enlargement of the Texas pipe-line system and to increase underground gas storage in southern California. The year-end deliveries of natural gas from Mid-Continent sources was in excess of 405,000,000 cubic feet daily. It is planned that by the end of 1954 deliveries will be increased to 705,000,000 cu. ft. daily. This will require paralleling nearly 100 miles of the present 30-in. line which runs from Blythe to Santa Fe Springs, and the building of two additional compressor stations.

An additional $19,000,000 will be required to recondition and replace older pipe lines and plants and reinforce the present pipe-line system.

Lone Star Plans Underground Storage of Natural Gas

DALLAS. — Construction of facilities for underground storage of natural gas in the depleted oil and gas field near the town of View in Taylor County is under way by Lone Star Gas Co. Gas is expected to be injected into the reservoir not later than May 1.

A 440-hp. compressor is being installed with capacity to inject approximately 5,000,000 cu. ft. of gas a day into the reservoir. Injection will be through four wells in View field. Cost of the compressor station, injection and withdrawal lines, and other facilities, will be in excess of $215,000.

The new underground storage, with a reservoir capacity in excess of 2,000,000,000 cu. ft., will provide a more stable market for gas produced in West Texas. Gas for storage will come primarily from fields in Scurry, Coke, Schleicher, Sutton, Runnels, and other West Texas counties, with delivery through Lone Star's interconnected pipe line network. When withdrawn to meet peak consumption demands, gas will enter the company's pipe line system near Abilene.

Shell Will Enlarge Plant

TULSA.—Shell Oil Co. announced that its Elk City, Okla., processing and gas recycling plant will be enlarged.

Processing capacity will be increased from 150,000,000 cu. ft. of gas daily to 220,000,000 cubic feet per day. Construction will begin as soon as materials are delivered.

The original plant went on stream in February 1951 and was designed to process 100,000,000 cu. ft. of gas per day and inject back into the producing formation 75,000,000 cubic feet. In June 1952 the processing capacity was increased to 150,000,000 cu. ft. with an injection capacity of 135,000,000 feet daily.

Bids for Gas Service to Northwest to Be Heard

WASHINGTON. — The Federal Power Commission has recessed until March 2 its hearing on the application of rival companies to supply gas to the Pacific Northwest.

West Coast Transmission Co., Inc., Wilmington, Del., and Pacific Northwest Pipeline Corp., of Houston, want to build pipe lines north from the San Juan basin in New Mexico and Colorado. Northwest Natural Gas Co., New York, has filed a third application seeking to serve the area by building pipe lines from Canada.

An attorney for Pacific Northwest recently testified he was "confident" his company had sufficient reserves in the San Juan basin for the project. West Coast Transmission will testify on its gas reserves when the hearing is resumed.

NATURAL GASOLINE

New Kermac Plant Will Begin Operation This Month

OKLAHOMA CITY.—Initial operation of the new natural-gasoline plant now being erected for Kerr-McGee Oil Industries, Inc., in Moore County, Texas, is scheduled for middle March.

Design rating on the new facility, known as Cactus Plant No. 12, is set at 55,000,000 cu. ft. of natural gas daily. Based on this input, total production will run to 38,000 gal. per day of raw, deethanized gasoline.

Dresser Engineering Co. of Tulsa is designer and erector of the project.

Production at Gasoline, Cycling Plants Gains

WASHINGTON. — Production at natural-gasoline and cycling plants averaged 670,000 bbl. daily in December for a gain of 25,000 bbl. daily over November, according to the latest Monthly Natural Gasoline Report of the Bureau of Mines.

Natural-gasoline plants accounted for 537,000 bbl. daily of the December total with the remaining 133,000 bbl. daily credited to cycling plants.

Output of L.P.G. in December was 322,500 bbl. daily or only slightly less than half of total plant production.

Plant production for the entire year 1952 averaged 605,100 bbl. daily for an increase of 7.9 per cent over the revised figure for 1951.

Production of L.P.G. for the year was up 15.9 per cent over 1951 compared with a gain of 3.8 per cent production of natural gasoline. Plant output of finished gasoline and naphtha for 1952 was 60,200 bbl. daily or a little less than the average for 1951. Production and delivery of condensate as such also was less in 1952 than in 1951.

New Facilities to Provide For Separation of Propane

McKAMIE, Ark.—Facilities are currently being installed at the natural gasoline plant of McKamie Gas Cleaning Co., here for separation of propane.

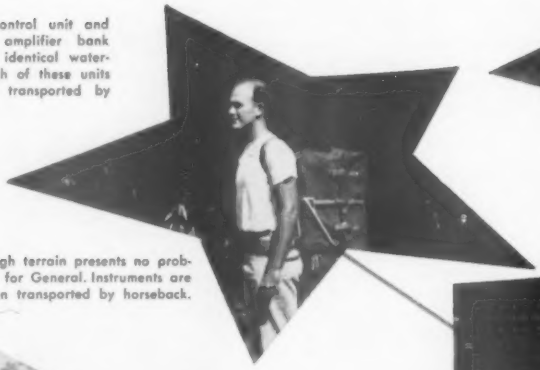
The plant's rating on total liquids produced is 1,320 bbl. daily. Gasolines and heavier run to 800 bbl. daily with normal and isobutanes adding up to 520 bbl. daily.

The new propane fractionating and handling facilities are scheduled to go into service early in April. Dresser Engineering Co. of Tulsa is handling the project.

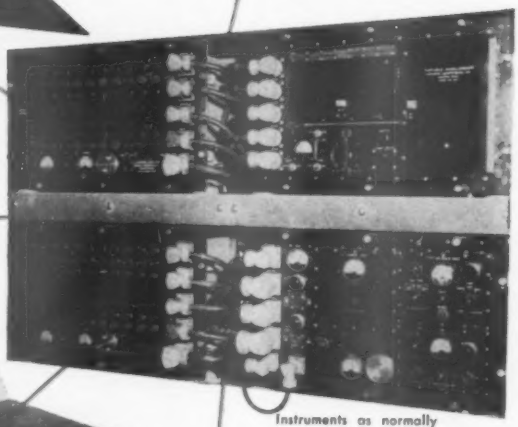
FIVE-STAR General VERSATILITY

1 General's modern equipment is normally operated from rugged, specially designed trucks from Canada to the Gulf Coast. In five minutes time, equipment can be removed from the truck and converted to portable operation.

2 The Camera, control unit and each 12-trace amplifier bank are housed in identical watertight cases. Each of these units can be easily transported by one man.



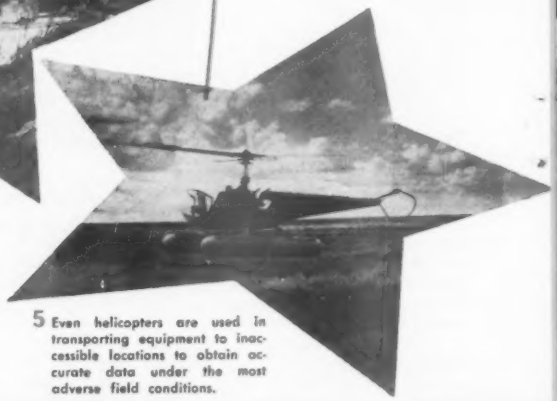
3 Rough terrain presents no problem for General. Instruments are often transported by horseback.



Instruments as normally installed in truck

4 In swamplands, General crews utilize air boats, marsh buggies, skiffs, weasels and other appropriate means of transportation.

General has the men, equipment and experience to help you explore deeper horizons. General's Dual-Purpose seismic units permit maximum portability without sacrificing General's high standards of efficiency in normal truck operations. These modern instruments, manned by experienced General crews, are your assurance of successful exploration programs.



5 Even helicopters are used in transporting equipment to inaccessible locations to obtain accurate data under the most adverse field conditions.

General GSC

GULF BLDG. GEOPHYSICAL COMPANY HOUSTON, TEXAS

Horseshoe Atoll Still Going Strong

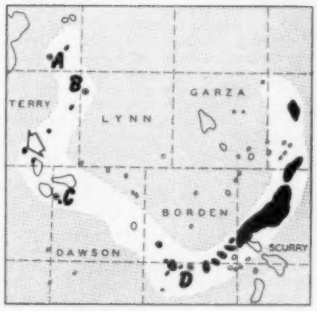
THE Horseshoe atoll of Scurry reef fame is still high on the list of West Texas' most promising areas for future discoveries.

Though it is no longer anticipated that any oil-bearing buildups comparable in size to the massive ones of Scurry County will be found on this atoll, it is generally expected that many sizable oil fields in reef buildups and in overlying or flanking sands will be developed during the next few years.

The sketch map shows the general configuration of the Horseshoe atoll which lies in the northern end of the Midland basin. This big atoll was built during the Pennsylvanian. It began building in Strawn time, but it was throughout Canyon time that ideal conditions for widespread reef growth existed in the area and the buildup reached its maximum development. The reef continued building during Cisco time and on up into early Permian-Wolfcamp time but only in scattered localities. This growth on top of growth resulted in "pinnacles" that are now the primary objective in the reef search along the deeper portion of the westward-dipping atoll.

Scurry County has the largest productive reef of the atoll. It is 30 miles long and 8 miles wide with up to 750 ft. of gross saturated reef thickness. Here, principally during Canyon time, the reef growth built up a broad terrace with an irregular surface that contains 400-ft.-high pinnacles above the flanks which rise about 400 ft. from the bottom of the basin.

Following the discovery of the tremendous Scurry reef, interest in the Horseshoe atoll mushroomed as the widespread possibilities for oil production began to be recognized by early 1949. As wildcat activity progressed westward around the prospective trend it soon became evident that the reef banks of the atoll were discontinuous. It was found that the reefs were extremely erratic, not only in areal extent but in height of buildup; and that there were great variations of effective porosity and permeability within the buildups. It was also found that water



levels varied greatly from one buildup to the next and even within buildups.

An intense search for oil-bearing pinnacles of reef is continuing. In recent weeks there has been a spurt of success that is worthy of note: At A on sketch is Stanolind Oil & Gas Co. 1 Thompson, a southeast Hockley County wildcat which flowed 208 bbl. of oil daily from Pennsylvanian reef at 9,875-9,908 ft. At B is Dan Auld 1 Timmons, a northwest Lynn County reef discovery which flowed 289 bbl. of oil daily on ¼-in. choke from perforations at 9,803-64 ft. At C is Ponder Oil, Inc., 1 Lindsey which was completed pumping 115 bbl. of oil plus 18 per cent water from perforations in the reef at 8,566-71 ft. At D is Stanolind 1 Smith, between Vealmoor and East Vealmoor fields, which flowed 165 bbl. of oil in 13 hours from perforations at 7,773-96 ft. in the reef.

Though not one of these is an outstanding well in itself, collectively they and those discoveries which have been made previously indicate the potentialities of this area and the probability that numerous buildups are there to be tapped.

Not all of the reefs that have been found on the atoll outside of the immediate Scurry area are small. Wellman reef (arrowed on map) has a gross pay section up to 800 ft. in Wolfcampage reef and may drill out 1,400 acres. The variation in reef buildup is well demonstrated here. Off the north flank of Adair field, immediately to the the south, a Wolfcamp reef pinnacle was topped nearly 1,200 ft. higher than at Wellman and yet had water 60 ft. into the reef. *Philip C. Ingalls.*

References

Report of Investigations, No. 13, Bureau of Economic Geology, University of Texas, by W. A. Heck et al.

Starved Pennsylvanian Midland Basin, A.A.P.G. bulletin, December 1951, by J. E. Adams et al.

BEGINNING WITH THIS ISSUE: Wildcat completions henceforth will be found grouped together in a consistent order by states, and will follow the section of reports on significant developments. Successful wildcats will be flagged by asterisks (*).

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MISSISSIPPI.—In Chickasaw County, about 11 miles northwest of Muldon gas field, Carter Oil Co. 1 Clem Baskin heirs, Section 19-14s-5e, is a probable new gas field discovery.

WYOMING.—Forest Oil Co. has reported recovery of 400 ft. of free oil and 230 ft. of heavily oil-cut mud on test of the Phosphoria lime at 1 Mill Iron Land & Cattle Co., SE NE NE 8-46n-99w, Hot Springs County.

WEST TEXAS.—Stanolind Oil & Gas Co. 1 Smith, 45-31-T3n, T&P Survey, established a new reef structure between Vealmoor and East Vealmoor fields. Top of the reef was 7,767 ft., minus 5,142 ft., and completion perforations were from 7,773-96 ft.

CANADA

Gas Struck Near Drumheller Area Oil Production

The Stockton Syndicate, a group of Drumheller businessmen, has discovered natural gas at their exploratory driller 3½ miles south of Drumheller town. This venture, on farmout lands from Socony-Vacuum Exploration Co., found its gas in the glauconitic sands of the Lower Cretaceous.

The new gas well, Stockton-Socony 1 C.P.R. LSD 10, 22-28-20w4, is 6½ miles southwest of D2 Devonian oil wells in the Drumheller area. Top of the Glauconitic sands contacted at 4,395 ft., or 1,638 ft. below sea level. A 26-minute drill-stem test from 4,387-4,446 ft. flowed gas at maximum rate of 8,000,000 cu. ft. daily, and gave a 5-ft. recovery of drilling mud. Later, 1-hour test, in the basal sand, from 4,446-90 ft., yielded only 185 ft. of gas and oil-cut mud.

Hole was taken down to 5,905 ft. to test the Devonian horizons, which were noncommercial, and hole has been plugged back, with 7-in. casing set at 4,576 ft.

Gas at Halkirk.—Anglo American Exploration, Ltd., Calgary independent, has struck a flow of natural gas in the Lower Cretaceous at its wildcat in the Halkirk area of Alberta, 22 miles east-northeast of Stettler Devonian oil field and 14 miles east of natural gas production in the northeast Stettler region. The discovery well is on farmout lands from Canadian Superior Oil of California, Ltd.

The new gas strike was made at Anglo American 1 Halkirk, LSD 9, 28-39-16w4. Top of the gas sand was found at 3,778 ft., 1,234 ft. subsea. Crew found 30 ft. of water free gas section, down to 3,808 ft., prior to entering formation water. Three drill-stem tests were run between 3,778-3,808 ft., and estimated flow rate was from 3,000,000 to 5,000,000 cu. ft. daily. Hole is scheduled to test the D3 Devonian equivalent, and crew is drilling in the Devonian below 4,057 ft.

Homeglen.—The Homeglen wet gas discovery well has so far penetrated 321 ft. of D3 Devonian coral reef and coring and testing is continuing in that prolific condensate-bearing natural gas zone.

The California Standard Co. well drill-stem tested another 25 ft. of D3, and as yet has not given up any free oil or formation water. Latest reported drill-stem test at 3-29 Homeglen, from 7,851-76 ft., was run for 2 hours. The water cushion was forced to the surface in 8 minutes and natural gas flowed at maximum rate 4,900,000 cu. ft. daily. When pipe was pulled it was found to contain 480 ft. of gassified water cushion and oil-condensate.

This discovery well, located on LSD 3, 29-43-1w5, is 50 miles southwest of Edmonton and 15 miles west-southwest of Pigeon Lake Devonian oil wells.

EASTERN CANADA

Gaspe.—In the Gaspe peninsula, Quebec, New Peninsular Oil 1 is drilling below 6,100 ft. with petroliferous coral reef formation expected from 6,300 ft. down. The coral reef is expected in the lower St. Alban limestone, definitely encountered at around 5,450 ft. Casing was cemented at 5,000 ft. against gas and water intrusions at higher levels and to safeguard against high gas and oil pressures expected in the coralline limestone. New Peninsular is operating under a special mineral exploration license covering natural gas, oil and naphtha in 44,060 acres in the townships of Holland and Bonnecamp in Gaspe-North. Since Peninsular secured its drilling rights, other substantial oil interests have obtained acreage in the same general area.

Ontario.—In the Lambton fields, Nye de Mers, president of de Mers Engineering of Washington, D. C., has established offices in Petrolia in connection with plans for drilling operations in the old shallow oil fields, first opened at Oil Springs in 1857 and at Petrolia about 1860, and which are still showing a gradually declining production. Tests will be rigged about 4 miles east of Sarnia and at points near Petrolia and Oil Springs, with drilling to start in April or May.

The present operations are based on the theory that the oil heretofore produced was derived from tighter dolomite formations, including a 26-ft. strata around 480 ft. and a similar strata about 3,000 ft. De Mers Engineering has been carrying on a geophysical and exploratory program for the past four years, and drilling near Marthaville, northwest of Petrolia, showed traces of oil in a tight formation. It is believed the earlier shallow drilling and later occasional deep test penetrated the dolomite but that light nitroglycerin shots, about 18 quarts, customary in the field, were not strong enough to shatter the formation and release the oil. De Mers is planning to use 96-qt. shots. The company has subleased 3,400 acres from the Sarnia Oil & Gas Co. and is planning a systematic drilling program, based on an estimate of 36 million bbl. of recoverable oil still in the formations.

In Durham County, 50 miles east of Toronto, an American syndicate is planning to drill for oil 4 miles north of Newtonville. The Trenton limestone, at comparatively shallow depth, is the likeliest potential producing horizon.

OKLAHOMA

More Springer Gas in Caddo's Cement Field Area

The steady development of the Springer sands along the southern rim of the Anadarko basin picked up another big gas well in the eastern portion of Caddo County's Cement field.

Bay Petroleum Corp.'s 2 Rigney in the NE NW NW 12-5n-9w, is being cased for completion in the Springer with total depth at 6,779 ft. A test of that formation from 6,568-6,755 ft. flowed gas at the estimated rate of 10,000 M.c.f. per day with volume increasing. The new strike is located ¼ mile northwest of Little Nick Oil Co.'s Springer gas sand discovery that began the deep-zone activity in this field.

The same area recently had a Springer sand oil discovery at Deep South Oil Co. 1 Yule-Johnson in 1-5n-9w. That well was completed as Springer sand oil discovery from perforations at 6,740-47 ft. The well is being put on the pump after flowing at the rate of from 100 to 125 bbl. per day.

Another Bromide Discovery Listed for McClain Area

Simpson series development, which saw new discoveries at Southwest Goldsby, Washington, and West Washington last year, received a boost with a new indicated Bromide strike about 5 miles east and slightly north of Blanchard in McClain County.

The new Bromide discovery is Jay Simmons et al 1 Wilson, C SE SE 14-8n-4w, 1½ miles northwest of K. A. Ellison's 1 Tankersley in 25-8n-4w, which was completed recently flowing 7 bbl. per hour through 15/64-in. choke from the Bromide sand.

Simmons et al are coring below 10,212 ft. in the Bromide sand at the probable pool opener. The latest test from 10,161-200 ft. recovered 2,697 ft. of fluid, mostly gas-cut water load with a slight scum of oil, plus 180 ft. of gas-cut mud and 90 ft. of heavily gas-cut mud. A previous test from 10,111-126 ft. in the Bromide flowed gas at the rate of 15 to 20,000 M.c.f. per day with distillate spray.

Logan Oil Discovery On Flowing Production

Macmillan Petroleum Corp. et al 1 Krout, NE NW SW 14-15n-4w, Logan County oil discovery, was flowing at the estimated rate of 700 bbl. per day through open tubing.

Operators are making initial production gages following a flow of oil to pits and to tanks for a time at the new discovery southwest of Navina and northeast of Northeast Lockridge gas-distillate area. Oil from the field opener is flowing from perforations at 6,478-88 ft., and 6,501-39 ft. in the second Wilcox sand. The new strike is bottomed at 7,350 ft., total depth.

Macmillan et al have announced staking of the first offset to the new discovery at 2 Krout, SW NE SW 14-15n-4w, a southeast 10-acre offset to 1 Krout.

MISSISSIPPI

Possible New Gas Area Looms in Chickasaw

In Chickasaw County, Mississippi, approximately 11 miles northwest of Muldon gas field, Carter Oil Co. 1 Clem Baskin Heirs, Section 19-14s-5e, is a possible new gas field discovery. During the past week the well was fracture treated with 400 psi. of sand mixed with 400 gallons of diesel fuel flowed with 75 bbl. of 5 fuel oil and 51 bbl. of diesel oil. Breakdown pressure was 4,200 psi. and input pressure 3,500 psi. The first test was made on a ⅝-in. choke for 1 hour, the estimated rate of flow being 9,474 M.c.f. gas per day with tubing pressure of 950 psi. On a ¼-hour test the well flowed 5,100,000 cu. ft. of gas on a ¾-in. choke with tubing pressure of 1,500 psi. The third test was for 2 hours on ½-in. choke with pressure of 1,260 psi., flowing at rate of 7,867,000 cu. ft. of gas. The last gage was on ⅛-in. choke, flowing at rate of 579,000 cu. ft. of gas with tubing pressure of 1,675 psi. No gage was made on the amount of condensate produced along with the gas due to the fact that such a large amount of diesel fuel was used in the fracture treatment. The zone tested is from 4,301-60 ft. in the Carter (Chester) sand.

In Pearl River County, Mississippi, Gulf Refining Co. 1 U.S.A. "W," Section 8-1s-14w, after several attempts was successful in making drill-stem test in open hole from 13,500-586 ft. to test slight shows of oil encountered in 2 cores from 13,517-591 ft. Test was open 15 minutes, ¼-in. top and ⅞-in. bottom chokes, 6,000 ft. water cushion, good blow. Recovery was 2,800 ft. of salt water plus 1,440 ft. mud. A cement plug was set at 13,364 with 15 sacks after which casing was perforated 13,290-308 ft. with 108 shots. On drill-stem test, ¼-in. top and bottom chokes, 4,500 ft. water cushion, tool was open a total of 5 hours with a maximum tubing pressure of 5 psi. Recovery was 1,630 ft. salt water, 260 ft. mud plus water cushion. Operator plans to squeeze perforations and reperforate

from 13,275-290 ft. and test shows in upper part of sand zone.

In Jefferson County, Mississippi, Lyle Cashion Co. 1 Gordon-Stowers Armstrong unit, Section 17-9n-1w, is a possible new Wilcox discovery for Jefferson County. Approximately 10 ft. of sand was picked on log and by sidewall samples from 5,326 ft. to 5,336 ft. The well was drilled to total depth of 6,055 ft. and at present operators are preparing to run pipe. No drill-stem tests were made prior to running pipe.

TEXAS

WEST TEXAS

Reef Discoveries Added Along Reef Atoll

Exploration for Pennsylvanian reef oil along the periphery of an atoll that underlies several counties in the northeast section of the Permian basin has paid off in two additional discoveries. In another reef area a northeast extension and confirmation well was in prospect.

Stanolind Oil and Gas Co. 1 Smith, 45-31-T3N-T&P, established a new reef structure between the Vealmoor and East Vealmoor fields. Top of the reef was 7,767 ft., minus 5,142 ft. and completion perforations were from 7,773-96 ft. At last report the well had flowed 165 bbl. of oil in 13 hours of its completion test, through 14/64-in. choke.

Stanolind 1 Thompson, reef discovery 6 miles southwest of the Ropes-Pennsylvanian field in Hockley County, turned in a completion gage of 208 bbl. of 42° oil, plus 23 per cent water, from open hole pay at 9,875-9,908 ft. The gage was through 16/64-in. choke.

Later information said the well was making no water and operators would void the potential test and make a new one. On previous tests, it flowed 173 bbl. of oil and no water in 24 hours, on 16/64-in. choke; and 140 bbl. of oil the following 12 hours on 14/64-in. choke.

Top of pay was 9,908 ft. on elevation of 3,438 ft. and completion was without acid.

Along this same trend, Ponder Oil, Inc. 1 Lindsey, Dawson County discovery between Cedar Lake and Mungerville fields, completed on the pump for 115 bbl. of oil, plus 18 per cent water. Perforations were 8,566-71 ft. Top of the Pennsylvanian reef in this well was 8,565 ft. on elevation of 3,155 ft., which ran 140 ft. above the water table in the same formation in the Mungerville-Pennsylvanian field.

Honolulu and Signal 2 Matthews was showing for production as the second well in the southwest extension area of the Ropes-Pennsylvanian field of Hockley County. On drill-stem tests recovery was water blanket with no shows at 9,327-49 ft.; at 9,347-74 ft. recovery was 240 ft. of oil and 750 ft. of water blanket in 10 hours; and at 9,371-91 ft. recovery included 120 ft. of oil, oil and gas-cut water blanket and 180 ft. of oil and gas-cut mud. Total depth was 9,391 ft. and further testing was under way.

Ellenburger Offset Has Oil Show on DST

Stanolind 1 Fasken, northeast offset to Anderson-Prichard 124 Fasken, discovery well in the Midland Farms field of Andrews County, recovered some free oil, plus the water blanket cut with oil. Drill-stem test was from 12,590-654 ft.

Top of the Ellenburger was 12,605 ft., minus 9,538 ft., and a core to 12,655 ft. recovered dolomite with fractures and scattered vugs, with good oil stain. Anderson-Prichard's 1-24 Fasken, first Ordovician well in the area, completed in September last year for 675 bbl. of oil from pay at 12,672-702 ft.

Pecos Strike Flows Oil

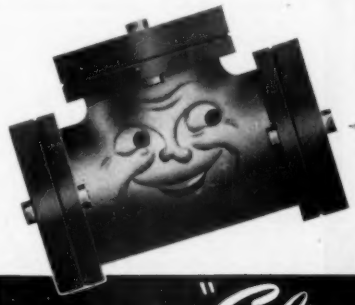
G. D. Putnam & Co. 1 Hart, north of the Brown & Thorpe-Ellenburger field, in 31-11-H&GN, had oil from two sections in the Clear Fork. First section tested from 2,595-2,601 ft. swabbed from 5-7 bbl. of oil hourly until water broke in and holes were squeezed.

New holes and two acid treatments from 2,415-49 ft. produced 126 bbl. of oil on the swab, when it kicked off and flowed 198.6 bbl. of new oil in 10 hours. It was then shut in for pressure build-up.

SOUTHWEST TEXAS

South Taft Field Opened

Flowing 218.14 bbl. of 42.7°-gravity oil per day through 5/32-in. tubing choke, Phillips Petroleum Co. A-1 Flinn has been completed as the discovery well of South Taft (tentative) field, San Patricio County. Wildcat is producing from casing perforations 7,185-92 ft. with 28 shots. Well flowed under tubing pressure of 1,200 psi., with gas-oil ratio measuring 1,015-1. Hole is bottomed at 8,843 ft., 7-in. casing is set at 8,690 ft. Wildcat, midway between Triple A and East White Point fields, is on the George H. Paul Subd.,



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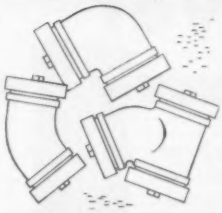

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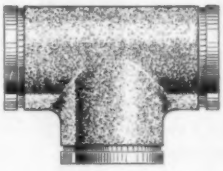

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Section 55, Coleman-Fulton Pasture, 2½ miles southwest of Taft.

Roberts Oil Co. 2 Adams, wildcat 5 miles southeast of Alice in Jim Wells County, has been completed as an oil well on perforations 4,981-86 ft., and operator is testing gas through perforations 3,402-14 ft. Tested on ¼-in. choke, well developed a flowing pressure of 950 psi., shut in pressure is 1,000 psi. From perforations opposite the oil sand, 2 Adams flowed 125 bbl. of oil per day on 8/64-in. choke, under tubing pressure of 675 psi. Operator will attempt to complete the well dually. Wildcat is on the Los Presenos Grant, A-281.

A new oil pool 7½ miles east of Gonzales in Gonzales County has apparently been opened by Producers Corp. of Nevada at 1 P. E. Johnston. Crews are waiting on power before pumping for production test, after the well flowed an estimated 50 bbl. of oil per day by heads on ¼-in. choke. Casing, cemented at 2,018 ft., is perforated from 1,960-65 ft. Hole is bottomed at 2,019 ft.

NORTH TEXAS

Caddo Discovery Makes High Potential

Jack County gained a new Caddo lime producing area 1 mile east of Bryson at J. A. Cato 1 Birdwell Lease, located in the M. Mabin Survey, A-413. Tests on perforations at 4,226-36 ft., following 5,000-gal. acid treatment, gaged 165 bbl. of oil in 5 hours through ½-in. choke. On completion potential the well tanked 840 bbl. of 42°-oil through the same choke size and perforations. Operators also reported an oil show in the lower Bryson sand from 3,390-3,400 ft.

In Montague County, L. W. Barrett et al 1 H. D. Field, east side test in the Hundley-Bend conglomerate pool, missed that pay in drilling to 6,650 ft. but plugged back to complete as a new pay discovery in the Strawn at 5,163-98 ft.

On production test the well gaged 162.5 bbl. of 41°-oil through ¼-in. choke. Gas-oil ratio was 500 cu. ft. and flowing tubing pressure registered 275 psi. Location is in the William Long Survey, A-1,392.

Pure Oil Co. 1 M. S. Easterwood extended production on the northeast side of the Claytonville Canyon limestone field of Fisher County. Completion potential of 2,544 bbl. of 44°-oil was based on an actual 6-hour flow of 424 bbl. through 48/64-in. choke. Pay section was open hole between 5,610-44 ft. Location is in 208-3-H&TC.

Blackwell Oil & Gas Co. has completed 1 Ray, W. C. Winter Survey, A-663, as a Mississippian discovery. Final gage was 103 bbl. of 44°-oil a day through 10/64-in. choke from pay at 5,287-94 ft. Location is 12 miles west of Archer City.

Corsica Oil Co. has completed its 1 Newman as a Strawn discovery in southeast Stonewall County, 1 mile southeast of Old Glory. Drill-stem test at 5,168-79 ft. indicated production with a recovery of 170 ft. of clean oil plus 60 ft. of oil-cut mud. Operators ran casing to 7 ft. off bottom at 5,172 ft. and washed the open-hole section with 500 gal. of mud-acid, then made production test which gaged 248 bbl. of oil a day through 18/64-in. choke. Top of the Strawn was 5,052 ft. on derrick-floor elevation of 1,678 ft.

TEXAS GULF COAST

New Frio Pay Opened

Greenbrier Oil Co. opened new Frio 4 pay in the Bailey Prairie area of Brazoria County with its H. C. Munson and is now building roads for the 2 Munson, northwest of the discovery. The discovery well drilled to 11,481 ft. and completed through perforations from 11,162-169 ft. at the rate of 274.31 bbl. of 36.2°-gravity crude daily. Flow was effected under a tubing pressure of 1,850 psi. with a casing pressure of 2,500 psi. and gas-oil ratio of 931-1.

At Harris County's Finfrock area, The Texas Co. has run open flow potential at its 1 C. F. Hoffman, new pay opener, crediting the well with a flow of 2,650,000 cu. ft. of gas daily with a shut-in pressure of 1,418 psi. The 7,995 ft. well is completed through perforations from 7,580-88 ft. and in addition produced some 54.2°-gravity condensate with gas-liquid ratio of 95,200-1.

EAST TEXAS

Gas Discovery Testing In Limestone County

Cities Service Oil Co. 1 Dorothy Bounds, Sarah McAnulty Survey, gaged 1,900,000 cu. ft. of gas a day through ¼-in. choke, plus 3 bbl. of distillate per 1,000,000 cu. ft., on preliminary tests of the Woodbine sand. Calculated open flow potential was 8,000,000 cu. ft. daily.

Perforations were from 4,217-36 ft. and flowing surface pressure was 1,310 psi. First holes in casing were made from 4,332-36 ft., which was expected to be in the water, but drill-stem test of the section had gas at the surface in 2 minutes and reached maximum pressure of 1,250 psi. Total depth of the well was 5,953 ft., in the Travis Peak.

Location is about 2 miles southwest of Wortham along the Mexia fault line.

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ROCKY MOUNTAIN

NORTH DAKOTA

Confirmation Location Made at Charlson Area

Elsewhere in the Williston basin, Amerada Petroleum Corp. has announced location for a confirmation effort at its Charlson area discovery in McKenzie County, North Dakota. The well is 1 Jellesed, C SW SE 16-153n-95w.

Two extensions in the Beaver Lodge-Tioga area of Williams County have been abandoned. U. S. Smelting, Refining and Mining Co. had a dry hole at 1 More, C SW NE 14-156n-95w, in Beaver Lodge, and A. M. Fruh-Northern Pump Co. reported failure at 1 Phillips estate, C SE NW 10-158n-95w, in the Tioga area. Objective in both wells was the Madison lime.

DENVER-JULESBURG BASIN

Cheyenne Discovery Finaled

In the Denver-Julesburg basin of Colorado and Nebraska, Chicago Corporation and Republic Natural Gas Co. have completed the discovery at 1 Krueger & Ladegard E½ E½ SE 31-14n-50w, Cheyenne County, Nebraska for an initial of 181 bbl. of oil per day on pump. The well produced from "D" sand. Meanwhile a second wildcat in the same section, 2 Krueger & Ladegard, SW NE SW 31-14n-50w, on a separate structure of the same feature has made oil in apparently commercial quantities. The well tested "D" sand from 4,755½-61 ft. and with tool open 1 hour and 20 minutes the recovery was 1,419 ft. of clean oil, 188 ft. of fresh water, and 6 ft. of mud-cut water. Both discoveries are on lands farmed out from Ohio Oil Co. in mid-1952. Since the assumption of responsibility for this acreage, aggregating some 30,000 acres, these operators have made three discoveries. The pool opened at the completed discovery has been designated Nichols field .

Wildcat starts in the Denver-Julesburg basin area were at a low point due to weather with only five reported. Two of these were in Colorado; three in western Nebraska.

WYOMING

Blizzard Slows Operations

The worst blizzard of the year struck the Rocky Mountain area last week, slowing operations in many parts of the region, and materially reducing the number of new starts, both wildcat and development, to be announced. Some operators in the Denver-Julesburg basin of Colorado and Nebraska estimated that a week would elapse before normal operations could be resumed in that badly drifted area.

The preceeding week showed the first instance of an active rotary count of less than 200 in the region since early 1952. The numerous shut-downs due to weather are expected to reduce the current count still farther.

The week produced important discoveries in most areas of the Rockies, despite the hampering effect of the weather, however. Of perhaps the most interest among these was an apparent discovery in the Walker Dome area of Hot Springs County, Wyoming, where Forest Oil Co. tested 400 ft. of clean oil and 230 ft. of heavily oil-cut mud from Phosphoria between 6,654-72 ft. Tool was open 1½ hours and flowing pressure was 240 psi.

The Phosphoria lime is a prolific producer in this area and the fact that no water was recovered on the test is considered extremely favorable.

The wildcat, 1 Mill Iron Land & Cattle Co., SE NE NE 8-46n-99w, is the first to be drilled in this area since 1934 when Ohio Oil Co. completed a second Frontier gas discovery in the NE Section 9 for a gage of 1 million cu. ft. per day. The wildcat is on lands farmed out by Ohio Oil Co. It is 1 mile west of Little Grass Creek which produced gas from both Muddy and Frontier sands, and 3 miles northeast of Enos Creek which produces from both Phosphoria and Tensleep. At Little Buffalo basin, 6 miles northwest of the Forest Oil discovery, production from Phosphoria and Tensleep makes it one of the better fields of the Big Horn basin. The operator is coring below 6,691 ft.

Also in Wyoming, Sinclair Oil & Gas Co. and Stanolind Oil & Gas Co. have run casing at 1 Unit, SW SE SW 21-33n-95w, in the North Sand Draw area of Fremont County. This well made 725 bbl. of 40°-gravity oil and 450 ft. of heavily oil-cut mud on drill-stem test of Tensleep from 10,727-752 ft. Top of Tensleep is logged at 10,696 ft., and with only 156 ft. of the formation penetrated, the operators will core ahead for completion. Big Sand Draw field, south of this wildcat, produces from a Tensleep section averaging 208 ft. in thickness.

The U. S. Navy has announced that no further drilling will be done in the Teapot Dome petroleum reserve after the present exploratory program is completed. The formal announcement stated that ending of the program was decided upon "Inasmuch as sufficient information for evaluation of Tensleep reserves has been acquired." The Navy made a Tensleep discovery at 1-X-G-10, N½c SE 10-38n-78w, in 1952 in the first well drilled in the reserve in many years. An extension attempt southwest of this discovery was a failure. A third well, 1-Tp-3, NE NE SW 3-38n-78w is now drilling below 5,505 ft.

MONTANA

Best Charles Shows to Date

The best shows to be reported in Charles formation along the Baker-Glendive anticline of Montana's Williston basin area were reported by Shell Oil Co. from its wildcat in the Cabin Creek area of Fallon County. The well, 22-33 Unit, NW SE NW 33-10n-58e, about 15 miles southeast of the Pine Unit discovery in Wibaux County made 500 ft. of gassy, oily and slightly watery mud in 2½ hours. Flowing pressure was 100 psi., and shut in pressure was 2,700 psi. Later test from 6,942-7,065 ft. made gas after 4 minutes at the estimated rate of 500 M.c.f. per day. Recovery in pipe was 270 ft. of gassy mud and 430 ft. of gassy salt water, and flowing pressure was 625 psi. Tool was open 2¼ hours on this test. At last report the operator was running drill-stem test at 7,065 ft., total depth. The wildcat is to go to Ordovician at about 9,000 ft.

NEW MEXICO

SOUTHEAST NEW MEXICO

North Denton Field Extended

The North Denton field was extended ¾ mile north at completion of Sinclair Oil & Gas Co. 1 Lee Whitman, 26-14s-37e, making the field's total length nearly 6 miles.

Drill-stem test from 12,302-68 ft. had oil to the surface in 1 hour and 2 minutes. It was cleaned into pits for 10 minutes, then turned into tanks to gage 210 bbl. of 43° oil in 2 hours. Recovery in the pipe was oil with no water. Operators completed the well from perforations in the Devonian at 12,350-415 ft. for a calculated daily potential of 2,568 bbl. of oil, on ¾-in. choke.

The new oiler continues the north-south trend of the field. Nearest producer in the field proper is Phillips Petroleum Co. 1 J. R. Forte in 35-14s-37e.

Skelly Oil Co. 1-S Mexico, 23-12s-32e, Wolfcamp discovery 1 mile south of the East Caprock field, flowed 422 bbl. of oil in 19 hours from perforations at 8,553-8,643 ft.

Location is about 3 miles southwest of nearest Wolfcamp production and 1 mile south of Devonian production.

ARKANSAS

West Midway Field Opened

A new oil pool has been opened about 2 miles west of Lafayette County's prolific Midway field with production from the Smackover lime.

McAlester Fuel Co. finaled 1-B Clifford McDonald in the NE NW 7-15s-24w flowing 280 bbl. of 30.9°-gravity oil per day through 12/64-in. choke from perforations at 6,569-81 ft. The new discovery, located in the northern part of Lafayette County, southwestern Arkansas, has been tentatively called West Midway field. Sunray Oil Corp. has staked a location as an east offset to the pool discovery well, seeking production to about 6,650 ft. in the Smackover.

Union Assured Discovery

Don D. Montgomery and associates are assured oil production by drill-stem tests in the Cotton Valley at their 1 Brasher, C SW NE 14-17s-16w, Union County wildcat, 1½ miles east of the old Lisbon field, and 2¾ miles northwest of El Dorado. A test from 4,951-64 ft. had gas to surface in 5 minutes and recovery was 885 ft. of oil. Wildcat will test the Smackover lime formation at depth of 6,800 ft.

SOUTH LOUISIANA

New Oil Production Found In North Stark Field

Sun Oil Co. has found new oil production in the 1 well North Stark field in Calcasieu Parish. Test under completion stage is the 6 Lutcher-Moore, located in Section 2-8s-13w. It is the northwest offset to the 5 Lutcher-Moore discovery well, which flows gas-condensate from perforations in Yegua formation between 9,015 and 9,030 ft. The 6 Lutcher-Moore has been drilled to 10,015 ft., set a 5-in. liner to 10,013 ft. with 95 sacks. Cement was drilled inside the 5-in. liner from 9,570-9,847 ft. and perforated near 9,750 ft.

The Texas Co. tested a slight gas show at the 1 J. E. and Julius Young, wildcat in Evangeline Parish, Section 18-5s-1w. Wildcat, which is bottomed at 12,304 ft., has 7-in. casing cemented to 11,100 ft. The string was perforated 10,776-778 ft. and from 10,788-797 ft. Tool was opened for 3 hours on ½-in. choke, making some gas, then perforated interval was acidized. Swab was run, recovered acid water along with wash water, then salt water broke in and began showing 100 per cent salt water and no sign of oil or gas. Section has been squeezed and another test will be made.

Magnolia Petroleum Co. has logged pos-

sible oil sand in the 1 Armas Sylvester, wildcat about 4 miles southeast of Ville Platte field in St. Landry Parish, and prepares to run drill-stem test. Log indicated possible oil show between 11,780-800 ft., core was then made from 11,553-891 ft., total depth, showing porosite with neglible permeability in the formation. Test will be made from present total depth.

LOUISIANA

More Work in Concordia

NORTH LOUISIANA

New development activity in Concordia Parish's Rifle Point area has been announced, promising that this section of east-central Louisiana will be the most active wildcat area in northern Louisiana again in 1953.

Magnolia Petroleum Co. has staked location for a north offset and confirmation try to the Rifle Point field discovery well, which was completed in December by Barnett Serio. The field opener flowed 132 bbl. of 44.5°-gravity oil per day from the upper Wilcox perforations at 4,031-35 ft. The new Magnolia test will seek Wilcox production to depth of about 6,000 ft.

Northwest of Rifle Point field at 3 Concordia Bank & Trust Co. Justiss-Mears Oil Co. and Serio have a new wildcat under way. The new try is located about 4½ miles northwest of Rifle Point in Section 30-8n-9e. Wilcox production will also be sought to about 6,000 ft.

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INDIANA

Rockhill Area Revived

A new round of development may be in store for the old, shallow Rockhill area, 4 miles north of Rockport, in southeastern Spencer County, as a result of oil showings found in a wildcat located ½ mile south of the present pool limits. The well, Joe Simpkins 1 Bretz, spotted in the NE SE SW 3-7s-6w, flowed clean oil during a 2-hour drill-stem test of saturated Tar Springs sand at 943-53 ft. Bottom-hole pressure gaged 410 psi. Oil-string has been run to the top of the pay for production tests.

Extension Indicated

A ¾-mile eastward extension of Benoist-sand production of the shallow St. Petersburg pool, in northern Pike County, is in prospect where C. E. O'Neal and J. B. Bushman are preparing to test their 1 Barker, SW NE NW 32-1n-8w. Location is about 3 miles southwest of the town of St. Petersburg. Saturation in Benoist sand was logged at 1,312-38 ft. Two drill-stem tests were made, one at 1,312-22 ft. getting gas in 8 minutes and recovering 150 ft. of oil and 5 ft. of oil-cut mud; and the other at 1,322-38 ft. getting gas in the same time and recovering 635 ft. of clean oil and 25 ft. of oil-cut mud. No water was indicated.

New Pay for Lamott Area

Promising oil showings have been encountered in Tar Springs sand in a test which Otis Bugg and associates are drilling on the northeast edge of the Lamott pool in Posey County. If commercial production is established, it will be the first from that pay zone in the immediate area. The prospective pay was logged at 1,973-80 ft., where a 60-minute drill-stem test recovered 50 ft. of clean oil with bottom-hole pressure of 540 psi. Hole is being deepened to lower pay zones of the field.

ILLINOIS

Calvin Pool Spreads

Production in the Calvin area, 3 miles northeast of Crossville, in extreme eastern White County, is getting a quarter-mile extension to the south. The extension well, 1 Dix, drilled by Mack Holt of Mount Vernon, Ill., in the SE SE NE 18-4s-14w, flowed at the rate of 30 bbl. of oil per hour in its latest reported production test following acidization. Pay zone is in McClosky lime, opposite which casing is perforated at 3,020-30 ft. Benoist and Cypress sands also showed oil in open-hole drill-stem tests.

MICHIGAN

Muskegon Wildcat Adds Pay

Although specific information was being withheld temporarily, deepening operations at the Taggart Bros. Gas Co. 1 Kessler, NW SW NW 7-12n-17w, Montague Township deeper horizon wildcat, Muskegon County, were reported to have penetrated additional gas pay, and well was also reported to be showing some distillate from a deeper pay zone. Some water was logged but

it was reported to be a small amount. Hole was plugged back to the shut off this water-cut. Well is believed to still be in the Niagara formation.

The original gas pay, which is now killed, plus the new showings were scheduled to be acidized. It was expected that information regarding these new shows and the results of the acid treatment would be announced next week. However, it was indicated that the new shows may be of prime importance in evaluating additional drilling in this area, and in wildcatting for deeper horizon pays along the rims of the Michigan basin. Well first showed gas in the basal Salina-Niagaran on drill-stem test at 3,732 to 3,805 ft., where gas was reported to have been gaged for 200,000 cu. ft. a day. After a 3,000-gal. acid treatment at 3,731-3,850 ft., well was reported to have been gaged at 2,000,000 cu. ft. of gas a day. Well was originally drilled to 3,890 ft. Hole was believed to have deepened to below 3,990 ft.

KENTUCKY

EASTERN KENTUCKY

On Camp Fork of Caney Creek in the Pike County sector of Big Sandy gas field, Kentucky West Virginia Gas Co. have an oil well at their 6060 J. I. Roberts. At a total depth of 2,358 ft. in Maxon sand topped at 2,176 ft. operators completed for 17 bbl. of oil daily. Top of oil pay was logged at 2,323 ft.

Also in Big Sandy gas field and on Stinking Branch in Pike County, Kentucky West Virginia Gas Co. completed a good gas well at 6072 Andy Collins. An open flow of 1,107,000 cu. ft. of gas daily was recorded from the Big lime (Mississippian) at a total depth of 2,389 ft. Big lime was encountered at 2,102 to 2,385 ft.

WESTERN KENTUCKY

Northeastern Hopkins County, an area that has received little attention until the past year, is getting another new pool to add to the succession of new oil discoveries which have been made within recent months.

The new pool is being opened by Jim Westfall, Jr., and associates at their 1 Parker, located in 19-L-25, northeast of the village of Hanson, 8 miles northeast of Madisonville, and 5 miles southeast of Slaughters. This well has indicated production in at least four zones, including the lower Renault lime at 2,828-36 ft., upper O'Hara at 2,904-12 ft., middle O'Hara at 2,944-52 ft., and lower O'Hara at 2,976-92 ft.

From the lower O'Hara zone, tested first, the well swabbed 60 bbl. of oil per day after acidization. The other zones, from bottom up, will be tested in order. At latest report, a temporary plug had been set at 2,955 ft. above the lower O'Hara interval, for tests of the middle O'Hara.

Location is about a mile west of Lohmann & Johnson Drilling Co. 1 Gailor, discovery well completed earlier this month in Aux Vases sand at 2,800-08 ft. Both wells are southwest of the two-zone Pond River pool, also a recent discovery.

APPALACHIAN AREA

PENNSYLVANIA

Elk Wildcat Under Control

Three miles northwest of Keta's 1 Charleroi in Benezette Township, Elk County, the 1 Woodring of Bennett's Valley Development Co. has been brought under control after blowing wild for three weeks. Drilling will be resumed in an attempt to increase present open flow of 1,000,000 cu. ft.

California Co.'s 1 Byron Schnyder in Pine Township, Lycoming County is reportedly shut down for orders at 6,450 ft. Little progress has been made on well in several weeks due to gas pockets in black shale section above Oriskany sandstone.

In Greene Township, Clinton County, Deep Rock's 1 Walizer is at a depth of 2,000 ft. and still troubled with lost circulation. This test started and is presumably still drilling in lower Ordovician limestones.

Deep drilling activity in Pennsylvania continues to center in the Driftwood and Benezette areas of southwestern Cameron County and eastern Elk County. Bids were opened this week on approximately 20,000 acres of state land divided into 9 tracts surrounding Keta's 1 Charleroi Mt. Club well.

CALIFORNIA

Shallow, High-Gravity Find Made in Tapo Canyon

A 700-bbl., 35°-gravity new pool discovery was recorded south of Tapo Canyon on the north flank of the Santa Suzanna Mountains, Ventura County.

The discovery, Terry Drilling Co. 2 Tapo, was completed in about 80 ft. of Luisian sand, middle Miocene, with perforations at 2,370-2,507 ft. Previously drilled to about 800 ft. by Aeco Corp. in an attempt to develop

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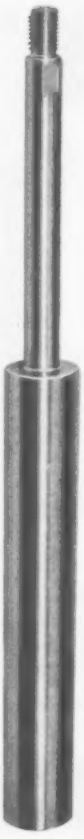

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Modelo production, Terry drilled the test to 3,755 ft. before plugging back.

Site of the discovery, which is near the east end of an 800-acre wedge-shaped tract, is in SW NE 13-3n-18w. Pacific Western Oil Corp. holds acreage to the south of the lease. Fee holdings of Union Oil Co. bound the tract on the three other sides.

The discovery is about 2 miles southeast of Union's expanding Oakridge field, which likewise produces from the Luisian at depths of 2,500 to 3,000 ft. Midway between the two fields its 15 Simi last year was drilled to 7,980 ft. While the Luisian was found to be wet, the good sand section found led to staking of the Oakridge discovery well.

Terry was preparing to start an east offset to the Tapo discovery and was grading location for a west offset. The former will involve redrilling of a 7,980-ft. dry hole drilled by Havenstrite Oil Co. in search of deeper production.

Oxnard Test Being Watched

Standard Oil Co. of California was believed to have a potential deeper pool discovery at its 1 McInnes in the old Oxnard field, 3 miles east of that Ventura County town. The operator has not released information on the test but field reports credit the wildcat with making a good show on a formation test in the Sespe at about 6,900 ft. The crude recovered reportedly was 22 gravity.

The wildcat, located in 6-1n-21w, was continuing to drill ahead to determine the thickness of the pay section. Deepest previous Oxnard test, in the same section, was a 4,270-ft. well of Vaca Oil Co.

Buena Vista Failure

That production in the Antelope fractured shale, upper Miocene age, will not extend through the saddle area between the two anticlinal structures of the Buena Vista field, Kern County, was shown by a northwest stepout on the southern anticline. The failure, the company's first after eight successful completions, was Honolulu Oil Corp. 6 22-P in NW 6-32s-24e. Drilled to 4,480 ft. and finding the Antelope wet, the test was abandoned after testing shallower zones.

About 1½ miles southeast, in SE Sec. 5, Standard Oil Co. of California 555 5-D also found the lower part of the Antelope wet below 4,400 ft. In NW 36-31s-23e, 2 miles southeast of the north dome discovery well, Standard was starting 522-36B McNee.

Los Angeles Basin Discovery

Midway in the approximately 2-mile stretch which separates its Sansinena production from its last year's Naranjal discovery, Union Oil Co. was completing 1 Lindauer as a new oil discovery. Located just inside the Los Angeles County line, in SE SE 33-2s-10w, the wildcat was expected to make a small pumper through 620 ft. of perforations above the plugged-back, redrilled depth of 4,855 ft. The discovery is on the Sansinena holdings owned in fee by Union.

Honor Rancho Extended

The Castaic Hills area of Honor Rancho field, upper Santa Clara Valley, apparently was given a ½-mile west extension by 45 Villa, a joint operation of Standard Oil Co. of California and Trousdale & Sterling. Casing was being run at 6,550 ft., total depth, after a formation test at 6,320-6,400 ft. yielded oil in 15 minutes. Standard was preparing to start an east offset to the extensioner, which is in NE SW 35-5n-17w.

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KANSAS

Development Spreads in New Morton County Area

Development in Kansas' westernmost producing area, Greenwood field in Morton County, has picked up considerable speed. The Greenwood gas area, which produces from the Morrow and Lansing (Pennsylvanian), was opened about 2 years ago. The field is located west of Hugoton gas field, and about 70 miles north of the Oklahoma Panhandle's new North Sturgis area in Cimarron County, opened recently with Morrow production. Pay in the Hugoton gas area to the east is from the Chase Group (Permian). The new Lansing pay at Greenwood was opened by Cities Service at 1 Greenwood "B," NE NE NW 14-33s-42w, 10 miles west of Hugoton, in 1951. Since that time four gas wells have been completed in that area.

There are nine tests in the area in progress at the present time. Cities Service has staked 1 Austin "A" in the NE NE SW 9-33s-42w, and has 1 Hermann "A," SE SE SW 1-33s-42w, near completion in the Morrow and Lansing. The 1 Smith in Section 20 has been gaged for 9,000 M.c.f. of gas per day from perforations at 2,906-72 ft. Another well, the 1 Drosselmeyer "A," in Section 21, is at critical level.

The significant Lansing production gives promise of a new rank area in southwestern Kansas. The Lansing is one of the state's leading producing formations in and around the Central Kansas uplift. Tests on the east side of the Hugoton field in Kansas have uncovered little or no Lansing production with most pay coming from the Morrow and Mississippian.

Activity Picks Up In Rank Wildcat Areas

Wildcatting activity in Kansas counties west of the Central Kansas uplift received a boost with three new tests being staked.

Tom-A-Hawk Petroleum is drilling below 2,466 ft. at 1 Schartz, NW NW NE 8-23s-16w, wildcat 3 miles southwest of Shady pool and 7 miles south of Larned, Pawnee County. Transit Corp. et al are below 2,000 ft. at 1 Castor, NE NE NW 32-17s-26w, wildcat 6 miles northwest of the nearest production at Aldrich pool and 1½ miles southwest of the old abandoned Kansas West pool in the western part of Ness County. Palmer Oil Corp. and Trans-Era Petroleum, Inc. are drilling below 2,000 ft. at 1 Doyle in the NE NE SW 27-22s-30w, rank wildcat 7 miles east of Sonderegger pool in the northeastern part of Finney County.

Trans-Era Petroleums, Inc. is drilling at 1-B Sinclair in the NW NW SE 10-21s-26w, 16 miles northwest of Hodgeman County's Jetmore pool. This test is located 8 miles south of Ness County's Manteno pool.

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WILDCAT COMPLETIONS

SOUTHWEST TEXAS (DISTRICTS 1 & 4)

Atascosa County: Geo. W. Delker 1 Henry Ripple, La Parita Colony Farms. Dry. TD 1,626 ft.

Dimmitt County: Henderson Coquat 1-C H. A. Dillon, Catarina Farms Subd. Dry. TD 5,115 ft.

Duval County: Chizum, Rhodes & Hicks and Pratt-Hewit Oil Corp. 1 Clara Driscoll Est., S. P. Peters Sur. Dry. TD 4,141 ft.

Edwards County: Humble Oil & Refining Co. 1 O. D. Collins, GC&SF Sur. Dry. TD 7,861 ft.

Frio County: C. C. Dauchey 1 Oppenheimer & Land Co., Francis X. Yung Sur. Dry. 5,008 ft.

Jim Wells County: Fidelity Oil & Refining Co. 5 A. A. Sharp, La Gloria Tracts. Dry. TD 7,602 ft.

Guadalupe County: W. A. Mills and Leslie Blackman 1 Walter Strampel, Jno. B. Cowan Lge. Dry. TD 2,040 ft.

Medina County: Geo. Parker 1-A Geo. Parker Fee, W. E. Jones Sur. Dry. TD 2,501 ft.

San Patricio County: F. M. Boykin, Jr. 2-A C. V. Jones, Geo. H. Paul Subd. Dry. TD 6,620 ft.

* Phillips Petroleum Co. A-1 Flinn, Geo. H. Paul Subd. IPF 218.14 BOPD 5/32-in., 42.7°, TD 8,843 ft.

Starr County: Daubert & Dolch 1 Dr. H. R. Maresch, GCSD&RGNS Sur. Dry. TD 3,621 ft.

Elisha Walker, Jr. 1 M. G. Salinas, Lot 10, S. E. Leonard S/D. Dry. TD 2,748 ft.

Webb County: G. G. Mortimer, Jr., 1 Pearl Pryor, GC&SF Sur. Dry. TD 2,664 ft.

* Zavala County: Shell Oil Co. 2 H. C. Plumly, GC&SF Sur. 3. IP 22,000 M.c.f. per day, TD 3,726 ft.

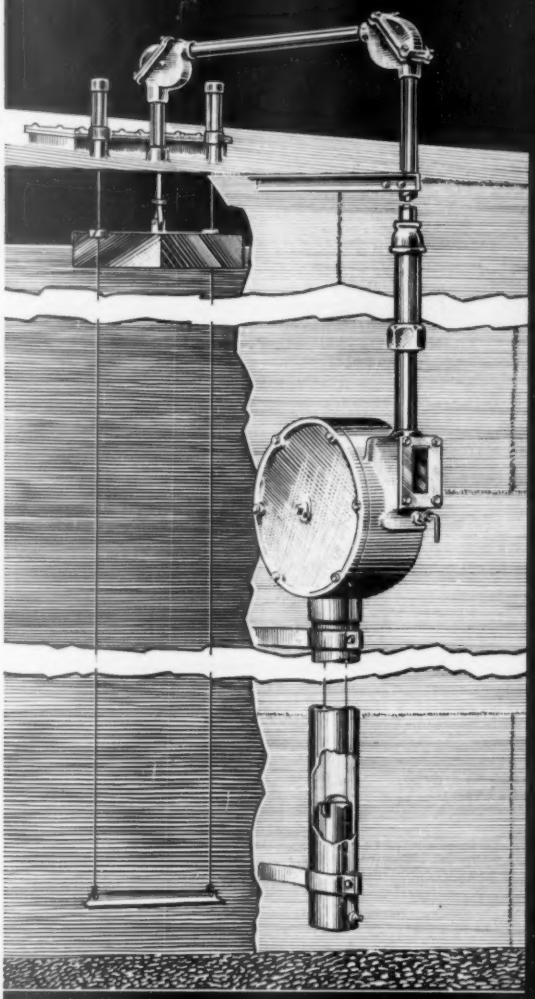
TEXAS GULF COAST (DISTRICTS 2 & 3)

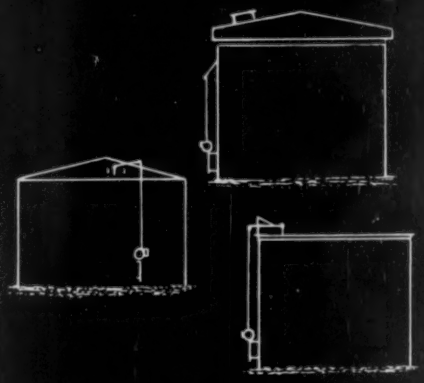
Bee County: H&J Drilling Co. 1 Billy Wood and Jose Richards, Alta Vista Addn. Dry. TD 4,180 ft.

Brazoria County: Dan J. Harrison 7 Mrs. Kittie Nash Gorce, Thos. Alsberry Lge. Dry. TD 9,519 ft.

* Calhoun County: Quintana Petroleum

Versatile GAUGING





This Shand & Jurs Automatic Tank Gage will accurately measure tank contents to 1/8 inch. It will do this repeatedly, promoting gaging economy, conservation of stored products, reduction of hazards to personnel, product and equipment.

Designated as Fig. ST-2935, this automatic tank gage is designed for use on cone, dome, water top, umbrella, cylindrical and other types of tanks. Its simplicity of construction and operation means maximum gaging accuracy for a long useful life.

This same gage housing, using suitable elbows and mounting brackets, can be used on other types of storage tanks as well. For floating roof tanks the S&J Fig. ST-2940 is applicable. Fig. ST-2890-G is for lifter or expansion roof tanks. But no matter which type S&J gage suits your requirements it will definitely reduce vapor loss and eliminate time required for manual gaging. Savings thus effected usually offset the original cost of S&J Automatic tank gages in a very short time.

S&J

Shand and Jurs Co. 8TH AND CARLTON STREETS · BERKELEY · CALIFORNIA

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Century 30 horsepower Drip Proof Motor on a pumping unit.

Century Oil Industry Motors'

RUGGED CONSTRUCTION

Keeps Them on the Job— Day After Day After Day

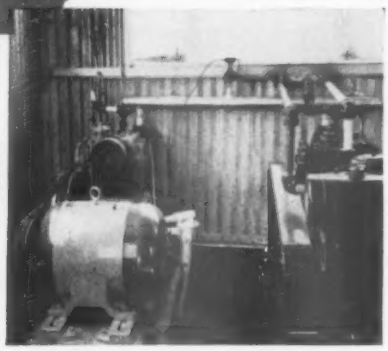
Century Motors are deliberately built to meet the unlooked for conditions. They will stand up under tough 3-shift continuous operation, when necessary. You'll find Century Motors giving satisfactory service in oil fields throughout the world.

FOR OIL PRODUCTION: Century Splash Proof Motors are widely used on outdoor installations such as pump rigs. Type SCT high torque, high slip motors start stiff pumps easily—and minimize shock reaction to pump parts.

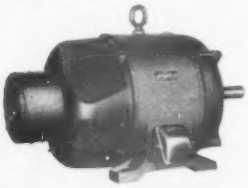
FOR REFINING AND DISTRIBUTION: Century "Underwriters' Approved" Explosion Proof motors protect life and property in explosive atmospheres.

Century Motors are available in a complete range of types, in sizes from 1/8 to 400 horsepower. For complete information, see your nearest supply store—or Century branch office.

Century C MOTORS



Century 5 horsepower capacitor type Explosion Proof Motor on an air compressor in a gas repressuring plant.



CENTURY TYPE ARC GENERATORS

Where public service current is not available, Century Generators will provide adequate, continuous electric power. Depending on the load per motor and the size of generator, from 10 to 30 wells can be operated from one generator. They provide a dependable source of oil field power.

CENTURY ELECTRIC COMPANY • 1806 Pine St., St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

CE-758

WILDCAT COMPLETIONS

Corp. 1 Lavaca Bay St. Tr. 9. IPF 165 BOPD, ⅛-in., TD 9,205 ft.

Colorado County: J. R. Butler et al E. J. Gracey et al, C. C. Dyer Sur. Dry. TD 10,510 ft.

Fayette County: Hamman Oil & Refining Co. 1 Alex Derry, Wm. Kuykendall ⅕ Lge. Dry. TD 2,004 ft.

* Goliad County: Dallas Husky 1 W. B. Wilson, Noah G. Stebbins Sur. IPF 60 BOPD, ⅛-in. TD 4,880 ft.

Harris County: Gulf Oil Corp. 1 B. J. Speek, Wm. R. Wilson Sur. Dry. TD 9,325 ft.

Liberty County: General Crude Oil Co. B-2 Bert W. Colby, Juliana Malley Sur. Dry. 11,000 ft.

Live Oak County: V. G. Schimmel 2 E. B. Lennox, G. L. Hass Sur. 59. Dry. TD 3,590 ft.

Montgomery County: David L. Gordon 1 P. M. Masters, Walker County School Land Sur. Dry. TD 7,350 ft.

Victoria County: Magnolia Petroleum Co. 5 Keeran Ranch, Martin de Leon Grant. Dry. TD 7,507 ft.

EAST TEXAS

Anderson County: Wheelock-Weinschel 1 L. J. Huffman, E. C. Harris Sur. Dry. TD 9,820 ft.

Cherokee County: Garvin Oil Co. 1 M. E. Ezell, Tract 2, T. S. Craig Sur., A-194. Dry. TD 5,064 ft.

Fannin County: J. J. Lynn 1 John Black, Wm. H. Smith Sur. Dry. TD 6,200 ft.

* Harrison County: Zephyr Oil Co. 1 E. S. Bogue, Lucinda Wallace Sur., A-744. IPF 7 BOPD, 7/64-in., GOR 22,710, Pettit 6,180-6,220 ft. TD 6,580 ft. W extension to Waskom field.

Navarro County: Four W Oil Co. 1 I. T. Kent, Robt. Caradine Sur., A-139. Dry. TD 3,618 ft.

Van Zandt County: Bribach & Browning 1 Crim, Nacogdoches CSL Sur. Dry. TD 3,311 ft.

Ben F. Whitaker 1 Hamilton, David Clapp Sur., A-127. Dry. TD 6,016 ft.

Wood County: E. B. Germany 1 D. B. Clonts, Brooks & Burleson Sur., A-431. IPP 77.5 POBD, 22°, sub-Clarksville 4,781-85 ft. TD 5,673 ft. New pay in Pine Mills area.

WEST CENTRAL TEXAS

Callahan County: Johnson & Warren 1 Blan Odom, Sec. 229, Wm. E. Pledge Sur. Dry. TD 1,034 ft.

Van-Mar Oil Co. 1 Lucy Whitehead, Sec. 17, BBB&C Sur. Dry. TD 1,412 ft.

Coleman County: Bay Petroleum Co. 1 Millie Popnoe, 27-2-T&NO. Dry. TD 3,861 ft.

W. B. Curtis 1-B McDonald, Sec. 272, Wade H. Bynum Sur. Dry. TD 1,900 ft.

* Carl Hovgard 1 Eulys Johnson, 91-2-GH&H. IP 316 BOPD, 16/64--in., 44°, pay 3,163-71 ft. TD 3,224 ft.

Sherwood B. Owens 1 D. A. Adams, 168-2-Asa Wickson Sur. Dry. TD 1,793 ft.

* French M. Robertson and F. Kirk Johnson 1-C Hamon, 519-9-San Augustine University Sur. IP 204 BOPD, 20/64-in., 42°, pay 3,904-15 ft. TD 3,950 ft.

Fisher County: American Trading & Production Co. 1 C. A. Dooley, Sec. 90, Gillespie CSL. Dry. TD 6,662 ft. in Ellenburger.

* Haskell County: Thos. D. Humphrey & Sons 1-A-McGregor, 63-A425-W. Wadsworth Sur. IPP 93 BOPD, 37°, pay 2,520-28 ft. TD 5,355 ft.

Humphrey & Sons 2-A McGregor, 63-A425-W. Wadsworth Sur. Dry. TD 2,585 ft.

Humphrey & Sons 3-A McGregor, 63-A425-W. Wadsworth Sur. Dry. TD 2,601 ft.

Walter L. Parr 1 V. M. Meador, 60-1-H&TC. Dry. TD 6,102 ft.

* Jones County: W. E. Butler 1 Annie Lassiter, Sec. 17, D&DA Sur. IP 164 BO 16 hours, 20/64-in., 40°, pay 2,254-64 ft. TD 2,622 ft.

Inca Drilling Co. 1 Eben Shuquist, Sec. 198, BBB&C Sur. Dry. TD 4,677 ft.

Mid-East Oil Co. 1 J. A. Griffin, Sec. 270, M. Worthington Sur. Dry. TD 3,205 ft.

* Nolan County: J. D. Wrather Jr. 1 J. E. Davis, 35-Z-T&P. IP 354 BOPD, 16/64-in., 50°, Ellenburger 6,598-6,615 ft. TD 6,615 ft. New field.

Intex Oil Co. 1 Gracey, 49-23-T&P. Dry. TD 6,612 ft.

Palo Pinto County: Homer S. Head 1 Gauldin, Sec. 1,742, TE&L Sur. Dry. TD 1,585 ft.

Shackelford County: J. J. Lynn 1 Hendrick Estate, Sec. 180, ETRR Sur. Dry. TD 4,896 ft.

Stephens County: L. W. Brooks 1 Jean Sweeney, Sec. 1,409, TE&L Sur. Dry. TD 2,232 ft.

Stonewall County: F. Kirk Johnson 1 T. K. Smith, 142-1-H&TC. Dry. TD 5,625 ft.

* Corsica Oil Co. 1 J. F. Newman, 3-B-AB&M. IP 248 BOPD, 18/64-in., 40°, Strawn 5,172-79 ft. TD 5,179 ft.

Taylor County: Moutray-Moore Drilling Co. 1 San Butman, 64-5-T&P. Dry. TD 4,173 ft.

NORTH TEXAS

Archer County: L. T. Burns 1 J. D. Bell, Lot 13, Blk. 5, Clark & Plumb. Dry. TD 4,296 ft.

* McAlister Fuel Co. 1 City of Wichita Falls, SPRR Sur., A-413. IP 176 BOPD, 19/64-in., 45°, Caddo 4,903-99 ft. TD 5,482 ft.

E. R. Perkins 4 Olin Calvin, H. Grooms Sur. A-155. Dry. TD 1,161 ft.

Cooke County: Howell, Holloway & Howell 1 C. W. Baker, Wm. Moore Sur., A-622. Dry. TD 4,787 ft.

Jack County: Bluebonnet Oil Corp. 1-A Hickman, Thomas League Sur. Dry. TD 740 ft.

Strata Drilling Co. and Marshall-Huett & Co. 1 Teague, A-554, 2 miles E Barton Chapel. Dry. TD 4,914 ft.

* E. L. Wilson 1 L. A. Worthington, J. J. Sanchez Sur., A-516. IP 55.4 BOPD, 11/64-in., Buttram sand 2,138-48 ft., TD 2,148 ft.

Montague County: Jack Grace Production Co. 1 Brooks heirs, Blk. 80, Belcher Subd. Dry. TD 5,845 ft.

R. C. Lipscomb and L. W. Barrett 1 Perry Browning, J. C. Burke Sur., A-1,067. Dry. TD 6,617 ft.

McQueen & Clevenger 1 A. J. Fenoglio, A. Harrison Sur., A-376. Dry. TD 6,560 ft.

Wichita County: Consolidated Oil Co. 1-I Dickinson, 2-1-Denton CSL. Dry. TD 4,490 ft.

Wilbarger County: Henry Cohen 1 W. T. Waggoner Estate, 38-4-H&TC. Dry. TD 2,004 ft.

A. L. Sauder Jr. 1 G. B. Ancell Jr., 34-6-H&TC. Dry. TD 2,100 ft.

* Frank Wood 1 Waggoner "Post," 41-4-H&TC. IPP 29.6 BOPD, 37°, sand 2,346 ft.

Young County: W. F. Bockhoff Estate 2 Roach, Sec. 196, TE&L Sur. Dry. TD 1,079 ft.

Bolin Oil Co. 1 W. Y. Wells, 759-A734-TE&L. Dry. TD 3,905 ft. in Caddo.

R. W. Darden 1 R. E. Daily, Blk. 180, TE&L. Dry. TD 962 ft.

Panhandle Oil Corp. 1 S. Hunt, 178-A425-TE&L. Dry. TD 1,001 ft.

W. T. Waggoner Estate 1-B Logan, A. N. Callen Sur., A-1,977. Dry. TD 4,007 ft.

W. C. Wainwright 1 J. C. Bloodworth, 217-A464-TE&L. Dry. TD 932 ft.

Wright, Clark & Senkel, Inc. 1 Abernathy, Sec. 1,928, TE&L. Dry. TD 5,303 ft.

SOUTHEAST NEW MEXICO

Eddy County: Jenkins & McQueen 1 State, 19-20s-27e. Dry. TD 1,815 ft.

Lea County: Neville G. Penrose, Inc. 1 Anderson-Federal, 31-20s-39e. Dry. TD 4,445 ft. in San Andres.

Snowden et al 1 Santa Fe RR, 27-11s-36e. Dry. TD 13,769 ft., Devonian 13,058 ft., elev. 4,020 ft.

Wilson Oil Co. 1-B Amerada-State, 27-16s-32e. Dry. TD 4,915 ft.

WEST TEXAS

Borden County: Lario Oil & Gas Co. 1-D Griffin, 62-25-H&TC. Dry. TD 7,248 ft. in Canyon reef.

* Ector County: Forest Oil Corp. 1-L TXL, 31-43-T1N-T&P. IP 261 BOPD, 12/64-in., 40°, Pennsylvania pay 8,621-31, 8,671-91 ft., TD 11,902 ft. New pool.

Lario Oil & Gas Co. 1 Cowden, 41-43-T2S-T&P. Dry. TD 4,505 ft.

Leed Oil Co. 1 W. L. Bradley, 18-43-T3S-T&P. Dry. TD 4,360 ft.

Gaines County: Delhi Oil So. 1 Oil Development Co. of Texas, 27-G-C&MRR. Dry. TD 14,202 ft. in the Devonian.

Garza County: Sohio Petroleum Co. 1 Swenson, 60-2-H&GN. Dry. TD 7,500 ft.

Hale County: DeKalb Agricultural Association 1 W. B. Pool, Sec. 5, Blk. D-4. Dry. TD 3,362 ft.

* King County: Shell Oil Co. 2-1 Burnett Estate, Sec. 1, Tyler Tap RR Sur. IP 145 BOPD, ¼-in. 36°, pay 5,520-40 ft.

W. E. Butler 1 Mrs. Mary Martin, 186-F-H&TC. Dry. TD 4,906 ft.

Loving County: Hanlon-Boyle, Inc. 1-C Mrs. Sid Kyle, 30-55-T1-T&P. Dry. TD 3,926 ft.

* Lynn County: Dan Auld 1 Timmons, 142-12-EL&RR. IP 289 BOPD, ¼-in., 47°, Pennsylvanian reef 9,820 ft., TD 9,909 ft. New pool.

Martin County: Cities Service Oil Co. 1 Orson, Sec. 139, M. Curtis Sur. Dry. TD 4,602 ft.

McCulloch County: Rogers and Thomas 1 W. O. Murray, Sec. 14, Allison Ogden Sur. Dry. TD 2,340 ft.

Runnels County: G. B. Cree and Cabot Carbon Co. 1 Vela Laird, Subd. 16, Marshall University Sur. 511. Dry. TD 4,280 ft.

J. J. Eisner 1 J. P. Davidson, Sec. 490, T. Green Sur. Dry. TD 4,634 ft.

C. E. Hyde 2 C. A. Wilson, R. M. Williams Sur. Dry. TD 2,931 ft.

Schleicher County: Ted Weiner and B. M. McFarland Drilling Co. 1 Williams Estate, 13-1-GH&SA. Dry. TD 5,579 ft. in Ellenburger.

Tom Green County: Clark & Charless 1 E. H. Jones, Conrad Schodel Sur. 756. Dry. TD 306 ft.

Oberholtzer and Holland 1 Superior-Compton-Oberholtzer, 11-4-Sur. 11. Dry. TD 709 ft.

Yoakum County: Western Drilling Co. 1 S. J. Dixon, 546-D-J. H. Gibson Sur. Dry. TD 5,412 ft.

ILLINOIS

Fayette County: Drilling & Exploration Co. 1 Heather, SE NW NE 20-5n-1w. Dry. TD 1,516 ft. in Rosiclare lime, top 1,470 ft.

Hamilton County: S. B. Griffith 1 Wilson, SE SE NE 20-5s-7e. Dry. TD 3,525 ft.

Stewart Oil Co. 1 McGill, NE NE NW 15-6s-6e. Dry. TD 3,345 ft. in St. Genevieve, top 3,174 ft.

Marion County: W. J. McGlasson 1 Gerrish

WILDCAT COMPLETIONS

heirs, SE SE NE 8-3n-1e. Dry. TD 1,647 ft. in Cypress sand.

White County: Indiana Farm Bureau 1 Spillman, SW SE SE 22-6s-10e. Dry. TD 3,153 ft. in St. Genevieve, top 3,019 ft.

INDIANA

Gibson County: F. L. Beard 1 Straub, Military Donation 25-1s-10w. Dry. TD 2,027 ft. in McClosky lime. Top St. Genevieve 1,953 ft.

J. Miskell 1 Ready, NW NW SE 19-2s-9w. Dry. TD 1,937 ft. in lower O'Hara lime. Top St. Genevieve 1,850 ft.

George & Wrather 1 Sampley, SE NE NE 13-3s-11w. Dry. TD in McClosky lime. Top St. Genevieve 2,174 ft.

Greene County: Dome-Minnick Oil Co. 1 Moore, SW NW SW 23-7n-6w. Dry. TD Devonian, top 1,627 ft.

Harrison County: H. Burton 1 Leffler, SW NW SE SE 32-4s-5e. Dry. TD 1,080 ft. in Devonian, top 700 ft.

Posey County: J. Miskell 1 Mann, 330 ft. SL and WL Fractional Section 6-4s-12w. Dry. TD 2,854 ft. in McClosky lime. Top St. Genevieve 2,760 ft.

WESTERN KENTUCKY

Christian County: E. O'Neal 1 Cowherd, EL NE NE SE 25-E-27. Dry. TD 1,931 ft. in Silurian, top 1,781 ft.

Daviess County: R. Hal Compton 1 Pruden, WL NW NW SW 14-N-28. Dry. TD 2,042 ft. in McClosky lime.

Kentucky Oil & Gas Co. 1 Miller, NE SE SE SW 25-P-28. Dry. TD 2,305 ft. in St. Louis lime, top 2,294 ft.

Ohio County: Stanoco 1 Tinley, N½ SW SW SW 3-L-31. Dry. TD 1,553 ft. in McClosky lime. Top St. Genevieve 1,408 ft.

MICHIGAN

Newaygo County, Dayton Township: Sun Oil Co. 1 Waters, NE SE NE 1-13n-14w. Dry. TD 2,343 ft. Traverse 2,296 ft.

Oceana County, Weare Township: McClure Oil Co. and Basin Oil Co. 1-A McLane, SE NW SE 14-16n-17w. Dry. TD 1,698 ft. Traverse 1,664 ft.

* Van Buren County, Columbia Township: Orville Palmer 1 Chapelle, SE SE NW 16-1s-15w. IP 25 BOPD. 500-gal. acid, Traverse 1,159 ft. TD 1,162 ft.

FLORIDA

Calhoun County: Sun Oil Co. 1 E. L. Jordan, Sec. 36-1n-11w. Dry. TD 5,002 ft.

Franklin County: Humble Oil & Refining Co. 1 A. S. Mitchell, Sec. 21-6s-5w. Dry. TD 4,736 ft.

ALABAMA

Choctaw County: Florida-Alabama Land & Mineral Corp. 1 L. C. Boney, Sec. 1-10n-4w. Dry. TD 3,700 ft.

Coffee County: Blair Oil & Gas Co. 1 A. C. Thames, Sec. 6-4n-21e. Dry. TD 3,830 ft.

MISSISSIPPI

Adams County: Serio-Justiss-Mears Drilling Co. 1 H. J. Foster, Sec. 55-8n-2w. Dry. TD 6,112 ft.

SOUTH LOUISIANA

Acadia Parish: H. L. Hawkins 1 Ora Childs, Sec. 55-7s-1e. Dry. TD 9,400 ft.

* Assumption Parish: Humble Oil & Refining Co. 1 St. Lse. 33-13s-13e. IPF 266 M.c.f. daily, 8/64-in. TD 12,962 ft.

Avoyelles Parish: Bates & Cornell 1 Chas. B. Peterson, Sec. 27-3n-5e. Dry. TD 7,308 ft.

LaFourche Parish: The California Co. 1 Calco-Phillips, City of New Orleans, Sec. 23-22e. Dry. TD 12,792 ft.

* Pacquemines Parish: Shell Oil Co. 3 St. Lse. 988. IPF BOPD, TD 9,503, 476 bbl. on 12/64-in. choke, 37°, TD 9,503 ft.

Vermilion Parish: Union Oil Co. of California 1 Jonas Weill, Sec. 54-13s-3e. Dry. TD 12,200 ft.

NORTH LOUISIANA

Bossier Parish: Cryer Drilling Co. et al 1 Atlantic Crystal, C NW NE SW 4-20n-13w. Dry. TD 2,214 ft.

ARKANSAS

Hempstead County: The California Co. 1 Bodcaw Bank 3, C SW NE 33-14s-23w. Dry. TD 6,197 ft. Smackover 5,958 ft.

* Lafayette County: McAlester Fuel Co. 1-B Clifford McDonald, ½ mile west of Palm, Sec. 7-15s-24w. IPF 280 BOPD, 30.9°, Smackover 6,569-81 ft. TD 6,645 ft. (Opens West Midway pool).

Miller County: Trans-Tex Drilling Co. 1 Davis, C SW SW 8-18s-28w. Dry. TD 4,503 ft.

OKLAHOMA

* Beaver County: Huber 1 Potter, C SE NW 26-6n-21eCM, IPF 1,008 BOPD, lower Oswego lime, 5,663-94 ft., TD 5,694 ft.

* Cimarron County: Coltexo Corp. 1 Purdy, C NW SE 20-6s-9eCM, IP 33,570 M.c.f. of gas daily, upper Morrow, 4,240-53 ft., TD 5,020 ft.

Cleveland County: Jay Simmons et al 1 Gross, NW NW NE 8-9n-3w. Dry. TD 9,870 ft.

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Refinery and Industrial Equipment

Ellis County: Continental Oil Co. 1 Berryman, C NW SW 15-17n-23w. Dry. TD 13,304 ft., Atoka 10,450 ft.
Grant County: W. A. Delaney, Jr. 1 Schoneweps, SW SW SW 7-26n-7w. Dry. TD 6,052 ft.
Kay County: Mid-Continent Petroleum Corp. 1 School Land, SE NE SW 13-29n-1e. Dry. TD 3,600 ft.
Lincoln County: Morgan Drilling Co. 1 Koss, SW NW SE 23-13n-4e. Dry. TD 4,500 ft.
W. F. Catlett 1 Gillian, NE SE NW 10-14n-2e. Dry. TD 5,287 ft.
Anchor Petroleum Co. 1 State, NW NW NW 16-16n-2e. Dry. TD 5,235 ft.
Stephens County: Atlantic Refining Co. 1 Colston, SW SW SW 9-1s-5e. Dry. TD 7,162 ft.
Christie-Stewart Drilling Co. 2 Tillerson, S½ NE SW 11-1n-9w. Dry. TD 1,779 ft.

KANSAS

Butler County: Rex & Morris 1 Phillips, NE SE NW 28-23s-5e. Dry. TD 2,512 ft.
R. J. Wixson 1 Kaufman, SE SE SW 25-24s-4e. Dry. TD 2,868 ft.
Westgate-Greenland 1 Diemart, SW NW NW 35-25s-3e. Dry. TD 3,231 ft.
Cowley County: Aladdin 1 Brooks, NW NW NW 15-35s-3e. Dry. TD 3,566 ft.
Ellis County: Murfin 1 Kuhn, SW SW SW 24-13s-17w. Dry. TD 3,620 ft.
Anschutz 1 Long, NW NW NW 36-13s-17w. Dry. TD 3,600 ft.
GMR 1 Boos, SW SW SE 31-13s-20w. Dry. TD 3,920 ft.
Ford County: M. B. Armer 1 Rolstin, NW NW NW 24-29s-21w. Dry. TD 5,269 ft.
Greenwood County: W. Clark et al 1 Hollis, NE NE NE 17-23s-11e. Dry. TD 2,469 ft.
Hodgeman County: Imperial 1 Hendrickson, NW SW NE 30-21s-22w. Dry. TD 4,605 ft.
Marion County: Franco Central 1 Meyer, NW NW NE 9-17s-3e. Dry. TD 3,180 ft.
Marshall County: Kansas Oil 1 Fisher, SW SW SW 9-4s-10e. Dry. TD 1,117 ft.
Reno County: Musgrove 1 Miller, NE NE SW 30-22s-10w. Dry. TD 3,690 ft.
Rush County: GMR 1 Bardel, NE NE NE 18-17s-18w. Dry. TD 3,760 ft.
A&A 1 Button, NW NE NW 32-19s-18w. Dry. TD 4,095 ft.
* Stafford County: Petroleum, Inc. 1 Stewart, NW NW NW 8-22s-13w, IPP 100 BOPD, Lansing-Kansas City, 3,433-35 ft., TD 3,807 ft. (opens Diamond pool).
* Westgate-Greenland 1 Copeland, NW SW SW 2-23s-14w, IPP 140 BOPD, Lansing-Kansas City, 3,640-50 ft., TD 4,050 ft. (opens Green Valley pool).

NEBRASKA

* Cheyenne County: Chicago Corp. and Republic Natural Gas Co. 1 Krueger & Ladegard et al, E½ E½ SE 31-14n-50w. IPP 181.21 BOPD, "D" sand 4,796-4,800 ft. TD 5,027 ft. "J" sand 4,946 ft. (New pool.)
Kimball County: Nebraska Drillers, Inc. 1 Ellis, NE NE SW 18-14n-55w. Dry. TD 6,625 ft. "J" sand 6,484 ft.

CALIFORNIA

* Kern County, ½ mile south extension to Midway field: Standard Oil Co. 27 "29 D," SW SW 29-32s-24e. IPF 79 BOPD, perforations at 5,333-76 ft., TD 6,879 ft., plugged back to 5,321 ft., elev. 931 ft.
Edson area: General Petroleum Corp. 27-9 Graham, 9-30s-29e. Dry. TD 6,744 ft.
Salt Creek area: Enterprise Oil Co. 9 Anderson, 19, 29s-21e. Dry. TD 618 ft.
Tejon Hills area: North Star Mining & Development Co. 1 "Well," 24-11n-18w. Dry. TD 480 ft.
San Luis Obispo County, Cuyama Valley area: J. F. Kosanke 1 Kosanke & Shannon, 16A-11n-28w. Dry. TD 266 ft.
Santa Barbara County, Cuyama Valley area: Superior Oil Co. 2 Cuyama Government, 28-9n-26w. Dry. TD 2,921 ft.
Solano County, Maine Prairie area: Amerada Petroleum Corp. 1 Harris, 16-6n-2e. Dry. TD 6,250 ft.
Tulare County, Kingsburg area: Gene Reid Drilling, Inc. 1 Giannini, 17-16s-23e. Dry TD 2,447 ft.

MONTANA

Fergus County: Cities Service Oil Co. 1 Huffine, C SW SE 27-17n-15e. Dry. TD 6,014 ft. Cambrian 5,950 ft.
Glacier County: J. F. Manning 1 Tribal 491, Coyote Springs area, C SE SW 26-36n-7w. Dry. TD 3,676 ft. Madison 3,584 ft.

WYOMING

Carbon County: Montana States Drilling Co. 1, C SE NW 9-25n-87w. Dry. TD 6,028 ft. Tensleep 5,908 ft.
Converse County: F. A. Gillespie & Sons Co. 1 Cook Government, NE NW SE 6-31n-70w. Dry. TD 1,110 ft. Frontier 1,025 ft.
Fremont County: Pioneer Oil Co. 1 Hornsberger, C SE NE 7-33n-94w. Dry. TD 6,545 ft. Tensleep 6,490 ft.
Hot Springs County: Greer-Davis 1 Government, C NW NE 7-44n-93w. Dry. TD -7,693 ft. Tensleep 7,671 ft.
Johnson County: Continental Oil Co. 1 Unit, NE NE SW 24-50n-82w. Dry. TD 13,205 ft. Morrison 13,178 ft.

UTAH

Duchesne County: Sinclair Oil & Gas Co. 1 Senor Mortansen, SW SW NW 7-3s-1w (USM). Dry. TD 10,000 ft. Wasatch 9,260 ft.
Carter Oil Co. 1 Moon, C SW SE 8-4s-3w (USM). Dry. TD 8,246 ft. Wasatch 8,096 ft.
Uintah County: Signal-Uintah Oil Co. 1 Government-Buesche, NE NE NW 1-6s-23e. Dry. TD 2,650 ft. Weber 2,447 ft.
Sinclair Oil & Gas Co. 1 Unit, NW NW NW 15-10s-18e. Dry. TD 9,500 ft. Mesaverde 7,790 ft.

WILDCAT COMPLETIONS

COLORADO

Logan County: McElroy Ranch 1 S. and M. A. Jackson, NW NE SW 11-7n-54w. Dry. TD 5,000 ft. "J" sand 4,894 ft.
Washington County: Amerada Petroleum Corp. 1 Hoyer (12 Strat Test), NE NE NE 3-4s-51w. Dry. TD 4,299 ft. "J" sand 4,004 ft.

MANITOBA

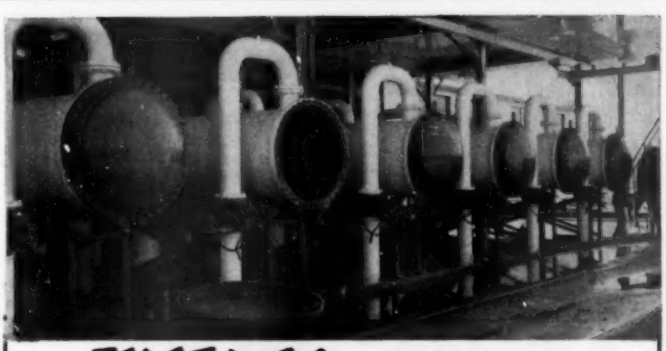
Homestead-Long Island 1 Birdtail, LSD 9, 21-15-27w1. Dry. TD 3,405 ft.

SASKATCHEWAN

* Tide Water-Jav 1 Crown, LSD 16, 29-15-15w3. Medium gravity oil in Jurassic. TD 3,440 ft.
Imperial-Tide Water 6-10 Climax, LSD 6, 10-3-18w3. Dry. TD 8,474 ft.
Superior et al 1 Coleville, LSD 6, 18-31-22w3. Dry. TD 2,725 ft.
Shell-Rio Tinto 2 Sceptre, LSD 5, 32-21-24w3. Dry. TD 3,530 ft.

ALBERTA

* Union 1 Fairydell, LSD 3, 21-57-24w4, oil



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Write for Bulletin FEQ-51

WARNER LEWIS COMPANY

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WILDCAT COMPLETIONS

in Viking sandstone, D2 and D3 Devonian zones, to take production from D3, TD 4,078 ft.

* Ostergaar 1 Gas Well, LSD 13, 31-14-13w4, capped gas well, TD 2,350 ft.

R. I. Smith-Socony-North Barons 1 CPR, LSD 15, 35-12-24w4. Dry. TD 5,915 ft.

H. B.-Union 3 Eaglesham, LSD 11, 3-78-26w5. Dry. TD 4,834 ft.

Baysel 6-21 Lost Rixer, LSD 6-21-24w4. Dry. TD 1,080 ft.

British-American-Cities Service 9-27 Natikewin, LSD 9, 27-91-3w6. Dry. TD 2,514 ft.

Socony-Sharples-Canadian Superior 1 Swalwell, LSD 8, 22-30-25w4. Dry. TD 7,896 ft.

Saskatchewan's Williston Basin Strike Extended

Sohio Petroleum Co. extended medium-gravity oil production ¾ of a mile east of the Wapella discovery well in the southeast sector of Saskatchewan. There have been four wells completed in the new pool as oil producers to date with initial potentials rated from 75 to 100 bbl. daily of 27°-gravity oil. There are three other wells drilling in the pool which was opened late last year by Imperial Oil. Ltd., and Tide Water Associated Oil Co.

Big Flow at Logan Strike

The latest report at the big new Wilcox sand discovery in Logan County, Oklahoma, states that the Macmillan Petroleum Corp. et al 1 Krout, NE NW SW 14-15n-4w, flowed at the rate of 1,200 bbl. of oil per day on the basis of a 3-hour flow through ½-in. tubing choke. The big flow followed mud acid treatment of perforations at 6,478-88 ft. and 6,501-39 ft. in the second Wilcox sand topped at 6,452 ft.

Big Gas Flow in San Juan Basin

Development of the San Juan basin gas area, which has had considerable attention recently, received a big boost with reports of the largest gas flow Pictured Cliffs sandstone recorded to date in the basin.

Benson & Montin's 21 Gallegos Canyon unit in San Juan County, New Mexico, flowed 9,100 M.c.f. of gas per day from the Pictured Cliffs below 1,401 ft. The development well is of great importance to the program under way to increase known gas reserves in the basin.

Big Madison Well Indicated For North Dakota Field

The M. P. Rudman-New Concord Corp. I R. Jensen 8-158n-94w, on northeast side of Tioga field, is reported to have made 54½ bbl. of 45.5°-gravity oil an hour on ½-in. choke, over a 3-hour period. Tubing pressure was 1,400 psi. The well was perforated in the Madison at 8,187-8,217 ft. with four shots per foot.

Rudman, the first independent oil operator to bring in a producing well in North Dakota, the 1 Math Iverson in Williams County, and New Concord Corp. of Toronto began a 3-year continuous drilling program on Williston basin properties last November.

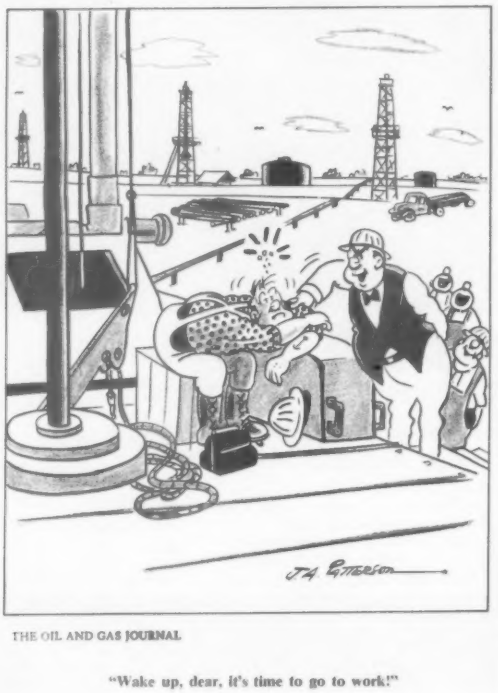
Little Beaver Now Northeast Colorado's Third Largest

Colorado's Little Beaver area of Washington and Adams counties is becoming one of the Denver-Julesburg basin's major producing areas. Development and step-out drilling is continuing in the area at a fast pace since its discovery last year. There are 15 completed wells in the field and others nearing completion in the Dakota "D" sands. Except for Mount Hope and Yenter pools Little Beaver field has the largest proven acreage of any Denver basin pool in Colorado, approximately 320 acres. The area has three separate structures, but none of them have been defined by further drilling.

New Producing County Slated for Wyoming

Crook County, Wyoming, has an indicated wildcat discovery in the making at True, Brown, Fulton, Gower & Winegar's 1 Stephenson in the Donkey Creek area.

Successful completion at the Dakota discovery would bring production to all but three of Wyomings 23 counties. The test is the first apparently commercial discovery in the northeastern Wyoming portion of the Powder River basin. The well made 5 bbl. of oil per hour swabbing from the Dakota at 6,320 ft. Pump has been installed at the wildcat, which is north of Weston County field production. It has been announced that an offset will be drilled immediately.



THE OIL AND GAS JOURNAL

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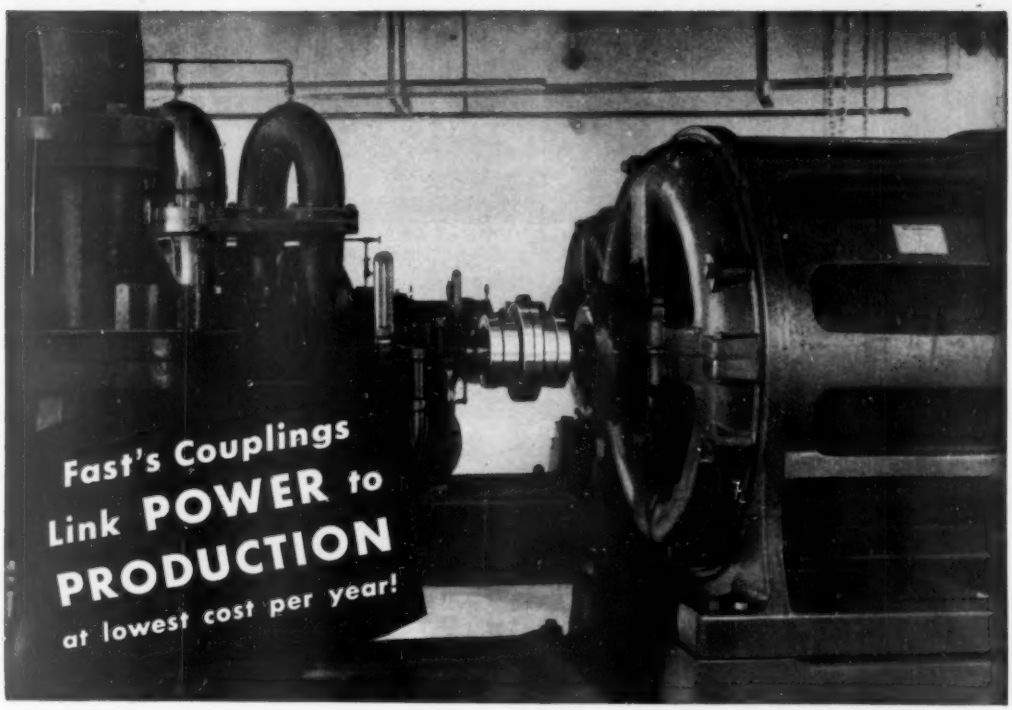

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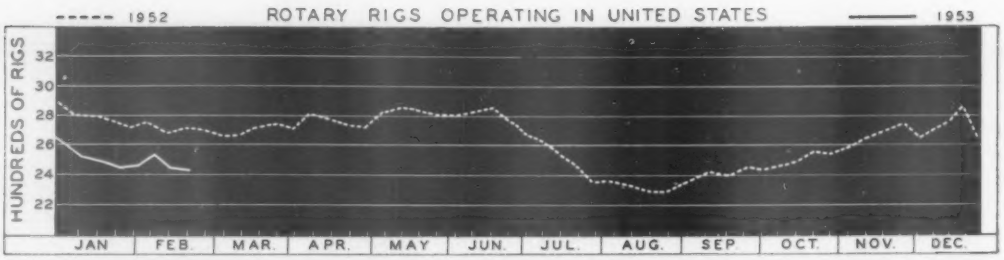
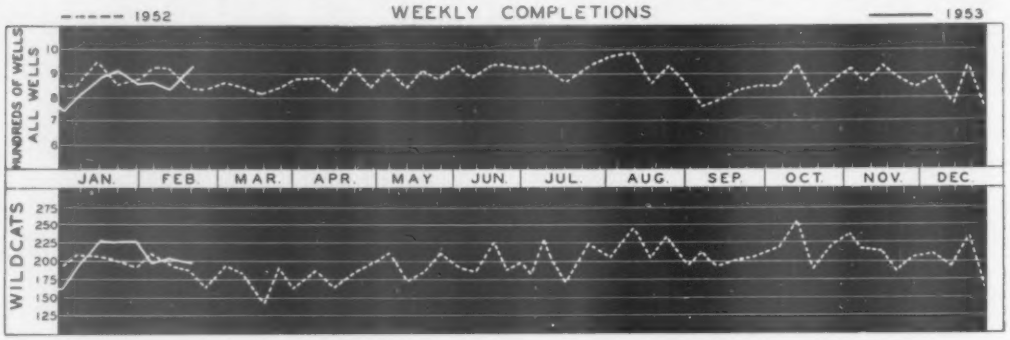




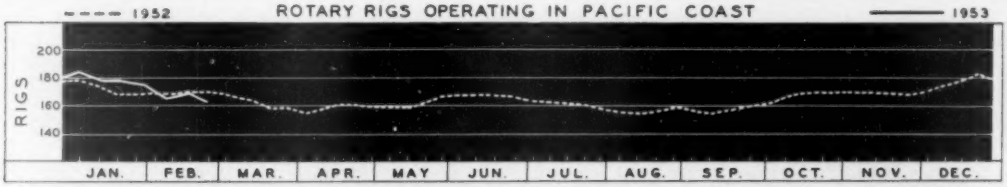
CURRENT STATISTICS

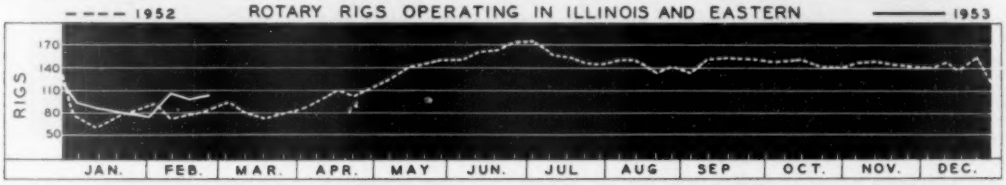
EXPLORATION

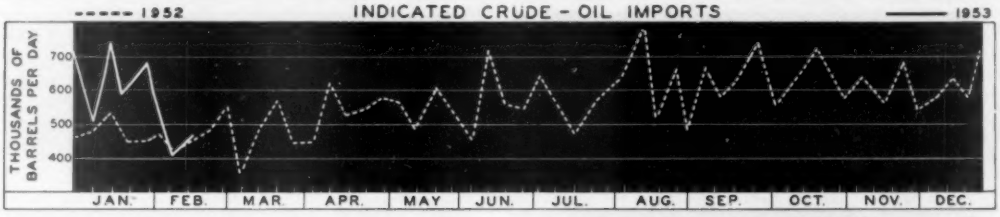
WEEKLY WELL COMPLETIONS . . . WEEK ENDED FEBRUARY 21, 1953

	Total of all wells					Feb. 21		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	11	5	0	*6	15,700	93	82	0	0	0	0	0	0	0	0	0	0
Pennsylvania	29	13	3	†13	40,802	234	223	0	0	0	0	0	0	0	2	5	7
West Virginia	17	2	12	3	44,420	80	92	0	0	0	0	0	0	0	0	0	0
Ohio	20	6	7	‡7	44,609	136	131	0	0	0	0	0	1	0	0	3	4
Indiana	19	5	0	§14	34,869	187	156	0	0	0	6	6	5	0	1	37	43
Kentucky	15	3	1	§11	28,793	152	180	0	0	0	4	4	4	0	1	27	32
Illinois	37	19	0	18	97,009	279	233	0	0	0	5	5	1	0	0	49	50
Michigan	11	5	1	5	26,072	86	78	1	0	0	2	3	5	0	1	31	37
Kansas	99	55	7	§37	325,460	635	703	2	0	0	15	17	17	0	3	110	130
Nebraska	5	3	0	2	30,400	42	43	1	0	0	1	2	3	0	0	19	22
Oklahoma	152	96	7	¶49	492,054	926	919	1	0	1	9	11	12	2	5	90	109
Texas	346	176	29	141	1,650,496	2,258	2,723	17	0	2	87	106	126	15	23	595	759
North Central (Dist. 7-B & 9)	130	74	0	56	438,079	789	852	9	0	0	36	45	67	0	4	243	314
West (Dist. 7-C & 8)	64	41	0	23	330,682	507	855	3	0	0	17	20	18	1	0	100	119
Panhandle (Dist. 10)	21	11	4	6	64,368	115	101	0	0	0	0	0	0	2	0	6	8
Eastern (Dist. 5 & 6)	17	7	0	10	98,092	100	118	2	0	0	6	8	4	0	0	35	39
Gulf Coast (Dist. 2 & 3)	60	19	17	24	414,108	354	415	2	0	1	10	13	22	2	7	91	122
Southwest (Dist. 1 & 4)	54	24	8	22	305,167	393	382	1	0	1	18	20	15	10	12	120	157
Louisiana	53	24	5	24	349,335	389	342	1	0	1	8	10	10	1	5	53	69
Northern	20	12	2	6	71,017	169	183	0	0	0	1	1	1	0	0	22	23
Southern	33	12	3	18	278,318	220	159	1	0	1	7	9	9	1	5	31	46
Arkansas	8	3	0	5	36,380	62	59	1	0	0	2	3	3	0	0	13	16
Mississippi	7	3	0	4	55,306	63	73	0	0	0	1	1	5	0	0	28	33
Southeastern States	4	0	0	4	17,268	22	8	0	0	0	4	4	1	0	0	18	19
Montana	6	1	0	5	22,724	53	17	0	0	0	2	2	1	0	0	11	12
Wyoming	16	8	0	8	90,711	84	73	0	0	0	5	5	1	0	0	22	23
Colorado	8	4	1	3	46,500	78	67	0	0	0	2	2	2	0	1	44	47
Utah	4	0	0	4	30,396	11	4	0	0	0	4	4	1	0	0	8	9
New Mexico	22	12	3	7	155,251	172	126	0	0	0	4	4	3	0	1	22	26
California	41	33	1	7	145,876	338	351	1	0	0	7	8	4	0	1	77	82
North Dakota	6	3	0	3	50,830	37	1	0	0	0	0	0	0	0	0	10	10
Miscellaneous	0	0	0	0	0	7	14	0	0	0	0	0	0	0	0	5	5
Total United States	936	479	77	380	3,831,261	6,424	6,698	25	0	4	168	197	205	18	44	1,277	1,544
Total previous week	832	438	69	325	3,505,767	....	....	32	3	5	164	204	180	18	40	1,109	1,347
Total February 23, 1952	835	451	63	321	3,416,444	....	....	22	1	6	135	164	198	14	36	1,243	1,491

Service wells included: *6, †11, ‡3, §1, ¶2.



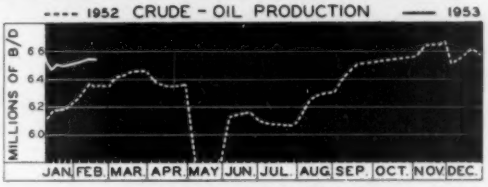


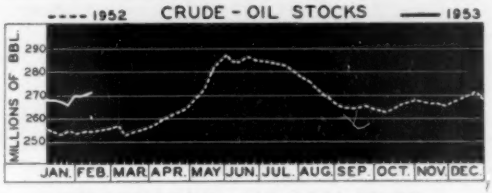


DAILY AVERAGE PRODUCTION FOR WEEK

	February 21			Feb. 14
	Crude oil	Lease condensate	Total	total
Alabama	4,100		4,100	4,200
Arkansas	78,300	700	79,000	77,850
California	989,100		989,100	989,700
Colorado	88,900		88,900	85,100
Eastern	54,400		54,400	54,500
Florida	1,550		1,550	1,550
Illinois	165,000		165,000	165,100
Indiana	33,700		33,700	34,100
Kansas	340,500		340,500	353,900
Kentucky	30,000		30,000	30,000
Louisiana	663,750	38,700	702,450	697,150
North	115,100	2,700	117,800	112,500
South	548,650	36,000	584,650	584,650
Michigan	35,300		35,300	35,200
Mississippi	91,900	4,800	96,700	96,100
Montana	31,000		31,000	31,000
Nebraska	12,900		12,900	12,800
New Mexico	178,525	625	179,150	179,350
Oklahoma	537,600		537,600	533,200
Texas	2,889,525	50,425	2,939,950	2,939,950
Dist. 1	36,500	250	36,750	36,750
Dist. 2	161,475	6,000	167,475	167,475
Dist. 3	471,750	25,700	497,450	497,450
Dist. 4	261,100	6,000	267,100	267,100
Dist. 5	51,850	400	52,250	52,250
Dist. 6	125,900	6,000	131,900	131,900
East Texas field	259,900		259,900	259,900
Dist. 7-B	111,400	100	111,500	111,500
Dist. 7-C	174,050	5,100	179,150	179,150
Dist. 8	971,800	350	972,150	972,150
Dist. 9	187,800	500	188,300	188,300
Dist. 10	76,000	25	76,025	76,025
Utah	5,300		5,300	5,400
Wyoming	212,000		212,000	216,900
North Dakota	11,600		11,600	10,600
Total U. S.	6,454,950	95,250	6,550,200	6,553,650
Change from previous week, down			3,450	
Canada	176,850		176,850	172,500
Total U. S. production January 1-February 21			338,990,825 bbl.	
Same period last year (crude plus cond.)			*326,474,400 bbl.	

*Includes 4,964,295 bbl. condensate.



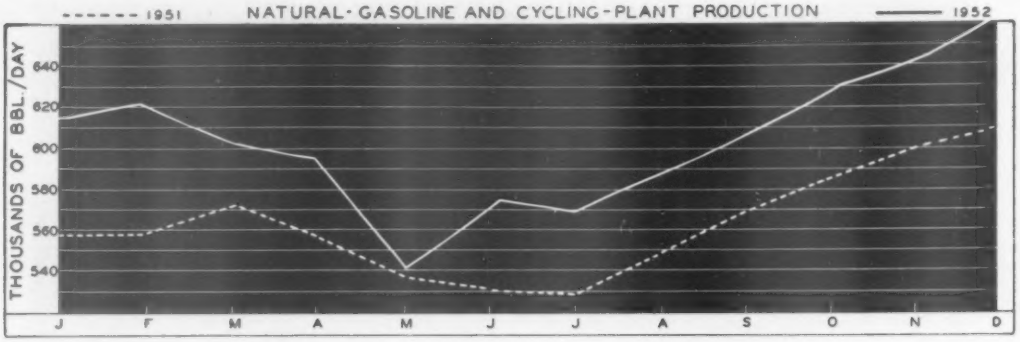


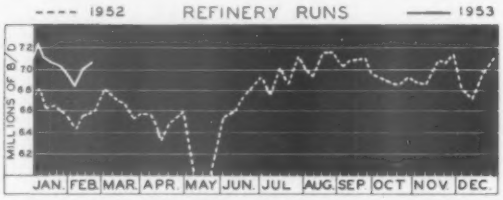
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

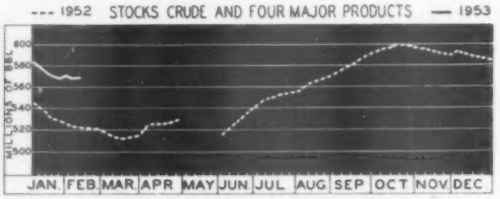
(Thousands of barrels)

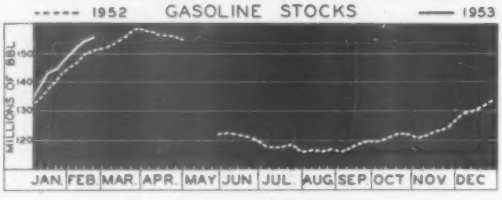
	Feb. 14, '53	Feb. 7, '53	Feb. 16, '52
Pennsylvania Grade	2,218	2,101	2,072
Other Appalachian	2,289	2,030	1,783
Illinois, Indiana, Michigan	10,151	10,438	11,195
Arkansas	2,917	3,049	3,251
Louisiana	16,257	16,106	13,783
North	2,430	2,354	2,708
Gulf	13,827	13,752	11,075
Mississippi	3,425	3,334	3,568
New Mexico	7,758	7,262	7,911
Oklahoma and Kansas	36,891	37,206	39,198
Texas	134,644	132,673	120,832
East Texas proper	11,040	10,941	10,419
West Texas	64,477	63,581	55,992
Texas Gulf	25,679	25,369	24,525
Other Texas	33,448	32,782	29,896
Rocky Mountain	15,681	15,348	13,983
California	32,872	33,325	31,302
Foreign	6,783	7,310	6,075
Total	271,886	270,182	254,953

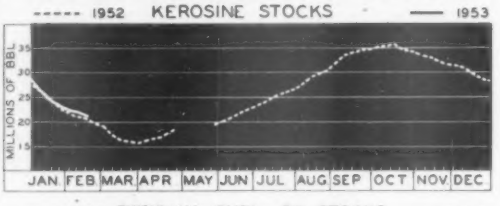
*Bureau of Mines.

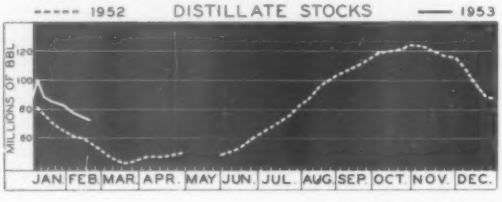


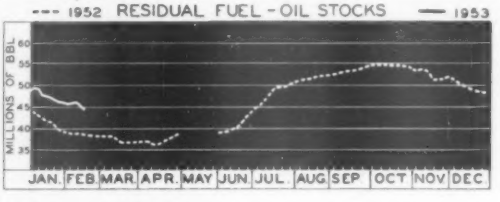










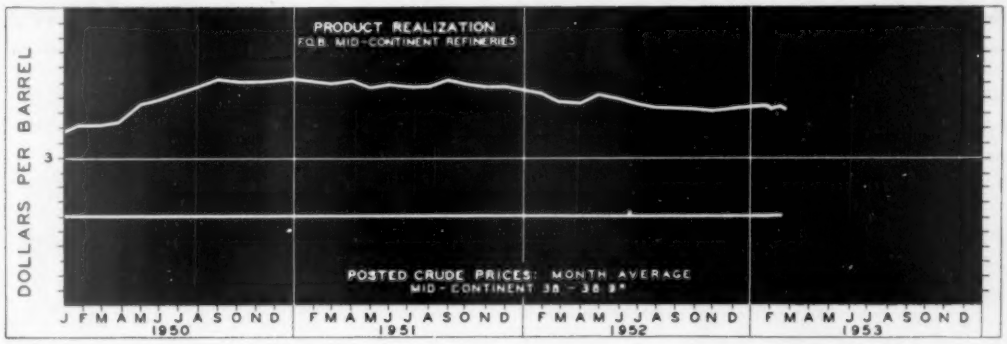


A.P.I. REFINERY REPORT, FEBRUARY 21

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, February 1952 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,078	460.8	57.3	297.7	259.1	34,819	9,322	25,706	11,493	973	383.9	41.5	252.4	245.5
Appalachian:														
District 1	107	39.3	9.0	17.4	15.1	4,533	517	1,122	575	109	45.1	4.7	19.3	15.0
District 2	94	47.0	9.0	15.0	16.6	1,867	281	489	200	82	39.1	5.1	14.0	20.2
Ind., Ill., Ky.	1,308	709.3	85.6	231.9	192.6	36,064	4,851	11,181	4,384	1,252	664.9	84.4	232.8	196.9
Okla., Kans., Mo.	586	336.0	10.9	122.6	54.6	17,201	1,146	8,087	1,142	556	310.6	13.6	134.5	68.4
Inland Texas	280	186.6	14.0	41.7	37.6	6,274	333	1,222	895	251	176.1	15.2	40.2	41.2
Texas Gulf Coast	1,730	821.0	169.1	439.3	267.3	20,680	2,510	7,276	6,264	1,645	740.0	137.9	421.3	255.8
La. Gulf Coast	532	249.6	63.4	131.1	53.7	8,075	1,275	3,494	1,255	530	214.6	49.0	154.8	60.3
N. La. and Ark.	81	27.7	7.3	28.6	5.7	3,461	419	1,132	100	79	35.5	7.2	20.4	6.8
Rocky Mountain:														
New Mexico	19	11.7		2.9	3.9	167		41	29	17	10.6	0.5	2.5	3.9
Other Rocky Mtn.	226	111.0	6.0	45.1	45.0	6,457	332	1,750	961	217	99.2	6.9	48.8	47.7
California	1,038	463.0	6.3	179.7	336.4	16,259	371	9,930	17,066	962	389.5	4.4	187.1	360.8
Feb. 21, 1953	7,079	3,463.0	437.9	1,553.0	1,287.6	155,857	21,357	71,430	44,364	6,673	3,109.1	370.4	1,528.1	1,322.5
Feb. 14, 1953	7,017	3,364.6	386.9	1,511.7	1,253.3	154,469	21,815	74,978	45,954					
Feb. 23, 1952	6,599	3,075.4	375.7	1,507.4	1,289.1	150,900	19,825	59,573	38,484					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38 9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.32 for week ended February 14, $3.35 for previous week, and $3.42 for Feburary 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of February 25, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10½	12.125-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.25-14.0	11¾-12
42-44 w.w. kerosine	8½-9	10.50-10.65	9
No. 2 straw fuel oil	7½-8	9.50-9.65	8
No. 6 residual	$0.85-1.00	$1.90-2.15	$1.50-1.65

NATURAL GASOLINE

	Group 3	North Tex.	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.60	6.10	6.35

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	12-13
750 vis., No. 3-4 neutral	15-16
2,000 No. 5-6 neutral	17-18

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	21-22
200 vis., No. 3 neutral, 0-10 pp.	12-13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	27.5
180 vis., 0 p.t. neutral	29.5

WAX
Mid-Continent

132-134 A.M.P.	5.5

THE third cut in natural-gasoline prices for the season came on February 21. On that date, sales of Grade 26-70 were reported at 5.5 cents a gallon for Group 3 and 5 cents for North Texas. The reductions this year have followed last year's pattern with two cuts of 0.5 cent each and a smaller cut of 0.375 cent. However, the reductions have been earlier than last year. In 1952 the three cuts came between February 26 and March 5.

Some operators in the Mid-Continent believe that the new price represents the probable low for the season since further reductions would not increase refinery use at this time. Increased demand for and greater production of motor fuel starting with the second quarter will take more natural gasoline than at the present when most refiners are blending for warmer weather but with total volume restricted by lack of demand for motor fuel.

Kerosine and distillate fuels are softer on the East Coast. Most of the major suppliers are posting prices of 10.65 cents a gallon for kerosine and 9.65 cents for No. 2 fuel, but material is reported to be available at 0.25 cent off these postings. These light fuels are readily available at 0.15 cent off.

Kerosine and light distillates are very soft in the Mid-Continent. The market is weak even at 7.5 cents a gallon for No. 2 fuel and 8.5 cents for kerosine. An important supplier in the Mid-Continent is reported to have canceled a pipe-line tender of light fuel scheduled for the last of February because of the volume of these materials in northern terminals.

No improvement has been reported in residual prices, either on the East Coast or on the inland markets. Some Group 3 heavy fuel is available to resellers at 75 cents a barrel with spot prices generally ranging up to 85 cents.

Winter movement of gasoline has been good in most areas, but markets tend to be slightly soft, particularly in the Mid-Continent.

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif‡	Okla. homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$2.11	....	....	....
19-19.9	2.18	....	....	....
20-20.9	2.24	$2.25	....	$2.12
21-21.9	2.30	2.27	....	2.14
22-22.9	2.37	2.29	....	2.16
23-23.9	2.45	2.31	....	2.18
24-24.9	2.53	2.33	$2.56	2.20
25-25.9	2.61	2.35	2.58	2.22
26-26.9	2.69	2.37	2.60	2.24
27-27.9	2.76	2.39	2.62	2.26
28-28.9	2.83	2.41	2.64	2.28
29-29.9	2.91	2.43	2.66	2.30
30-30.9	2.97	2.45	2.68	2.32
31-31.9	3.04	2.47	2.70	2.34
32-32.9	3.12	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50-cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.40
Southwest Pennsylvania	3.97
West Virginia	39.1
Illinois Basin	2.77

EQUIPMENT MEN . . . in the News

Harper, Gottwald Promoted By Rockwell Manufacturing

M. J. HARPER

H. GOTTWALD

L. A. Dixon, Jr., vice president of the meter and valve division of Rockwell Manufacturing Co., has announced the appointment of M. J. Harper as vice president and H. Gottwald as eastern regional manager of sales and district manager of New York district office.

Harper has been in the meter and valve division of the company for over 30 years as district manager of the New York office, and until his new appointment, he was regional manager of the Eastern region, coordinating the activities of the Boston, New York, and Philadelphia offices.

Gottwald joined Rockwell in 1928 as a sales engineer in the New York district. He then became assistant vice president of Rockwell International Division, and in that capacity traveled extensively throughout all the Eastern Hemisphere handling all meter and valve products of the company. For the past 2 years Gottwald has been general sales manager for the Nordstrom Valve Division.

Hughes Tool Plans Major Expansion of Houston Plant

A new 3-year expansion program that will increase the capacity of Hughes Tool Co.'s Houston plant approximately 40 per cent, was recently announced by Fred W. Ayers, senior vice president and general manager.

Construction of the first of the new buildings in this long-range program will begin shortly, according to Ayers. The increased capacity of the plant will further boost the company's payroll of 5,000, now one of the largest in the Southwest.

"Expansion of the facilities of the Houston plant," said Ayers, "is based on long-range studies made by the company and the oil industry. These reports anticipate an increase in the demand for oil in the years ahead. In order to meet these demands it will be necessary to drill more and deeper wells than are being drilled at even today's exceptionally high rate. To drill this increased number of wells, it will be necessary to have more rock bits, tool joints, and other oil-well tools."

Just recently Hughes Tool opened its new research and engineering laboratory, housed in a modern brick and masonry structure. This laboratory will enable the company to greatly expand the scope of its research.

W. A. McFadden Joins Southern Geophysical Co.

W. A. McFADDEN

W. A. McFadden has joined Southern Geophysical Co., Fort Worth, in a supervisory capacity to be in charge of Southern's Williston basin operations. The announcement was made by Dr. Sidon Harris, president. McFadden will be based in Billings, Mont.

McFadden received his B.A. degree in geology from University of California, Berkeley, Calif., in 1936. He joined Standard Oil Co. of California in 1937, spending several years in seismic operations in the San Joaquin Valley. In 1941 he was transferred by this company to Standard Oil Co. of Texas where he was in charge of Standard's geophysical operations in West Texas-New Mexico just prior to joining Southern Geophysical.

Maloney Promoted to Sales Manager by Brown Fintube

Brown Fintube Co., Elyria, Ohio, manufacturers of sectional heat exchangers, tank heaters, line heaters, gas heaters, and other heat-transfer products, has appointed H. F. Maloney, Jr., as manager of sales in the Cleveland district.

Maloney is a graduate of Ohio University. Before joining Brown Fintube in 1947 as design engineer, he worked briefly at both National Carbon and Weatherhead Co. In 1949 he was promoted by Fintube to estimating engineer, and brings to his new assignment wide and intimate experience in heat transfer.

Templeton Is Named Sales Representative by Bowen Co.

K. TEMPLETON

S. R. Bowen Co., Santa Fe Springs, Calif., has announced the appointment of Knight Templeton as sales representative for both domestic and export work.

Templeton was formerly associated with export representatives Roland Smith, and later with R. J. Eiche, Inc.

Stewart & Stevenson Moves Into New Dallas Headquarters

The Dallas branch of Stewart & Stevenson Services, Inc., has recently moved into new headquarters at 3919 Irving Boulevard. Stewart & Stevenson is distributor for General Motors diesel engines; Climax Blue Streak engines; Chrysler industrial engines; Petter diesel engines, and Gardner-Denver pumps. The Dallas branch carries a complete stock of repair parts. Carsey Manning is manager.

Schlumberger Announces New Promotions and Transfers

New promotions and transfers to continue the expansion program of Schlumberger Well Surveying Corp. have been announced by W. J. Gillingham, executive vice president.

W. J. Lytle, who has been serving as Permian basin division manager at Midland, Tex., has been transferred to Fort Worth as assistant area manager for Northwest Texas.

George Decker has been named to replace Lytle in Midland. Decker's service with Schlumberger dates from 1940, with assignments at various locations in Texas and a period of service in Canada. Since 1950 he has been Kansas division manager.

R. K. Forsythe will replace Decker as Kansas division manager at Wichita. He was formerly in Calgary, Alta., and was located for several years in California.

H. W. True has been appointed South Louisiana division manager with offices at Gretna, La. He replaces H. A. Nystrom, who was recently transferred to the Houston office. True was formerly Mississippi division manager at Jackson.

T. A. Morris is the new manager of the company's Mississippi division. An employe of Schlumberger since 1937, Morris has been associated with Southeast area operations since he joined the company. Before his new appointment he was district manager at Harvey, La.

Fischer, Betley Elevated To New Posts by Aeroquip

Election of George J. Fischer as vice president, sales, and Matthew J. Betley as vice president, manufacturing, of Aeroquip Corp., Jackson, Mich., was announced recently by Peter F. Hurst, president.

G. J. FISCHER

M. J. BETLEY

Fischer was elevated from the position of general sales manager. Prior to joining Aeroquip, he was associated 18 years with B. F. Goodrich Co., of Akron.

Betley assumes his new post after serving Aeroquip as works manager. He was previously associated with Electric Sprayit Corp. of Sheboygan, Wis.

Web Wilson Oil Tools Elects Officers

Recently elected officers for Web Wilson Oil Tools, Huntington Park, Calif., include, left to right: W. W. (Web) Wilson, board chairman; W. A. Wilson, president; B. M. Landis, vice president, and John W. Rife, secretary-treasurer.

Becknell, Melchior Advanced By M. W. Kellogg Co.

R. V. Becknell has been appointed manager of the project engineering department of The M. W. Kellogg Co., a subsidiary of Pullman, Inc., and O. G. Melchior as associate manager, it has been announced by Ronald B. Smith, vice president in charge of engineering. Becknell and Melchior were formerly Kellogg project managers.

R. V. BECKNELL

O. G. MELCHIOR

Becknell will serve as administrative head of the department and in addition will be technically responsible for the project engineering on all company contract work in North, South and Central America. Melchior will be technically responsible for activities on European contracts.

The appointments of G. H. Branscombe and N. W. Lewis, formerly job engineers, to the position of project engineers were also made known by Smith.

Hunter Transferred by Empire Machinery Co.

Effective February 1, M. J. (Jack) Hunter was transferred to Odessa, Tex., as sales manager by Empire Machinery Co. Hunter was formerly district manager at Abilene, Tex.

New Oil Well Branch Store To Serve Williston Basin

The opening of a branch store at Glendive, Mont., highlighted recent activities in Oil Well Supply's Rocky Mountain area, which have been announced by R. L. Armstrong, area manager for the U. S. Steel Division.

Manager of the new store, which will serve the western part of the Williston basin, is Clair D. Haas, formerly manager of Oilwell's Powell, Wyo., store. Haas moved to Cut Bank, Mont., as Oilwell store manager in October 1944.

Menifee N. Swisher, formerly manager of Oilwell's Worland, Wyo., store, succeeds Haas at Powell. Harold A. Adams has been named manager of the Worland store. Albert S. Finefrock is district manager, with headquarters at Billings, Mont.

Wheeler, Taylor Promoted By American Iron & Machine

W. R. Wheeler, Jr., has recently been promoted to the newly created position of assistant sales manager of American Iron & Machine Works Co., Oklahoma City. J. M. Taylor has been named special sales representative in Tulsa, replacing Wheeler.

W. R. WHEELER

J. M. TAYLOR

Wheeler has been associated with American Iron in various positions since 1935, with the exception of a period of 3 years from 1946 to 1949.

Before his new appointment to Tulsa, Taylor was export manager for Ameri-

can Iron in New York City since June 1949. He has served in various capacities in the company's sales department since 1936.

Maintenance Engineering Opens Offices in Dallas

In a move to expand the service facilities of the company, Maintenance Engineering Corp. has opened offices in Dallas, it has been announced by C. E. Naylor, president. The new Dallas offices will be in charge of James W. Campbell, who is prominent in the oilfield equipment and engineering field.

This new branch will handle sales of the complete line of Maintenance Engineering's products as well as those of the firms represented in this area by the company.

Painter, Caldwell Elected Welex Vice Presidents

T. W. PAINTER

B. M. CALDWELL

Ray O. Shaffer, president of Welex Jet Services, Inc., has announced that, effective immediately, the board of directors has elected T. W. Painter as vice president in charge of operations, and Blake M. Caldwell as vice president in charge of engineering.

Painter formerly served as comptroller for Texasteel Manufacturing Co. in 1947. In 1950 he became manager of the material department and purchasing for Welex, and in 1951 he was appointed operations manager. In his present position he is responsible for the materials section, and is in charge of field services, accounting department, and personnel section.

Caldwell previously spent 3 years with Phillips Petroleum Co. as manager of the instrument and equipment section of the research and development department in Bartlesville, Okla. Prior to his association with Phillips, Caldwell was with D + B Division of Emsco Derrick & Equipment Co. for 7 years, serving as chief engineer in Los Angeles, and manager of the Mid-Continent division located in Dallas. As vice president in charge of engineering, he is in charge of research, design, charge manufacturing and development, and engineering.

Chiksan Co. Expands Brea, Calif., Plant

Expansion of the Chiksan Co. plant in Brea, Calif., is under way to increase office area and warehouse and assembly facilities, it has been announced by H. J. Hagn, president. A large, modern building will be constructed adjacent to the present main office building. The new structure will have 28,000 sq. ft. of working area, and will consist of a finished material warehouse and assembly section, with an office area to accommodate the purchasing, personnel, cost accounting, price estimating, production and material control, and sales development departments.

United Geophysical Elects Martin Vice President

L. A. Martin was recently elected vice president and chief geophysicist of United Geophysical Co. He has been affiliated with United since 1946, and has served as manager in Venezuela, and manager of foreign operations.

Martin graduated from University of California in 1934 in geophysics, and later received an M.A. degree from California Institute of Technology. He formerly served with the Shell organization for 6 years.

Moore Is Made Sales Engineer for Eggelhof

E. L. MOORE

Edward L. Moore is now sales engineer for the Dallas office of Eggelhof Engineers, according to Henry Eggelhof, president. Prior to joining Eggelhof in September 1952, Moore was with Submarine Signal Co. in Boston. He attended Massachusetts Institute of Technology and received his degree in mechanical engineering in 1945.

National Appoints McCann Supervisor of Tubular Sales

Walter H. McCann, an employe of The National Supply Co. since 1936, has been appointed supervisor of tubular sales for its eastern division. He succeeds Walter Wirth, who recently retired after 43 years' service with the company.

McCann started with National Supply as a messenger at the Etna plant of the Spang-Chalfant division. He was transferred to the Pittsburgh office in 1939 as a clerk in the general order department, and after several intermediate promotions, became chief tubular clerk in 1948.

Western Co. Announces Two New Appointments

C. E. Smith has been named sales representative for The Western Co.'s Lubbock, Tex., area, and Charles Simmons has been appointed to pumping services manager of Western's Panhandle-Western Kansas district.

C. E. SMITH

C. M. SIMMONS

As a Western sales representative, Smith will do contact work for all company services in Lubbock, Levelland, Seagraves, and Brownfield, Tex., and surrounding territory. Smith has been associated with Western since 1944, and formerly was manager of Western's Panhandle-Western Kansas district.

Simmons in his new position will direct pumping services operations of the company's stations in Borger, Tex., Guymon, Oklahoma, and Ulysses, Kans. He has been with Western for nearly 5 years and has served as district engineer, station manager, and assistant district manager in the company's Permian basin districts. He will be located at Western's district offices in Borger, Tex.

(Continued on page 151)

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87′ Lee C. Moore Cantilever Derrick located East Central Oklahoma. Drilled one well since complete overhaul by Lee C. Moore. 4½′ substructure, steel floor, 4′ drop wings. $8,000.00. Box G-329, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE
Drilling rig used less than 6 months. Lee C. Moore Mast, N-4 Brewster Draw Works w/Hydromatic Brake powered by WAKU Waukesha gas engine, 2 slush pumps 6x12 and 5x10, 6000 ft. 3½ inch Drill Pipe, Tool House and Tool Boxes, Auto and Winch Truck. Ready to go to work. Call Rex or B. F. Snowden, 4-4106-2-2736, Tyler, Texas, or write P. O. Box 993.

NEW
4" O.D. ASPHALT COATED
IRRIGATION TUBING
12 gauge wall with belled ends
10,000 feet available
40 foot lengths
All sizes of pipe and tubing available for oil, gas, water and construction. Send us your requirements.
Write—Wire—Phone
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PRESSURE VESSELS
Immediately Available
NEW LOW PRICES
8—10′ ID dia. x 40′ x 3″ shell. Heads 3½″. Test Pressure 900 psi. WP 600#.
5—10′ ID dia. x 40′ x 2½″ shell. Heads 3″. Test Pressure 750 psi. WP 500 psi.
6—8′ ID dia. x 40′ x 2″ shell. Heads 2¼″. Test Pressure 750 psi. WP 500 psi.
All used, good condition, seam to seam, welded construction. Built by A. O. Smith Corp. Located near Chicago, Ill. Prints, prices available on request.
WIRE—PHONE—WRITE
KINSLOW POWER & EQUIPMENT CO.
817 So. Boulder, Tulsa, Okla.

EQUIPMENT FOR SALE

1 OILWELL Steam Pump, 16¼ x 7¾ x 20″. This pump is in excellent condition, may be seen at Makin Drilling Company Yard, Hobbs, New Mexico. Makin Drilling Company, Box 1628, Hobbs, New Mexico.

FOR SALE: 6000′ 4½″ OD Sonoscoped Drill Pipe, 4500′ 3½″ Reg. Drill Pipe, Rotary & Cable Tool Equipment. Giffin & Thompson Supply, Phone 477, Hoisington, Kansas.

LINE PIPE
20,000 ft., 4½″, 10.79 lb., plain end, Lap Weld line, cleaned, straightened and beveled for welding. Priced for quick sale. Edco Pipe & Supply. Phones 4-5970 and 9-8434, Box 151, Tulsa.

Gaso Duplex 4½″ x 6″ Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units, Westinghouse 20-25-50 KW Generating Units.
H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE
Bucyrus-Erie Spudder, Model 24L, purchased new in October, 1951, complete with all tools, house, water pump, water tank, light plant, etc.
(also)
Cyclone Drilling Machine, Model 46, purchased new in 1947, trailer mounted with lines.
Phone or Write:
MR. W. B. ARMSTRONG
P. O. Box 284
Wooster, Ohio
Phone: 2353

USED EQUIPMENT FOR SALE

1—4′ x 6′ x 30′ Mogul substructure Manufactured by Wichita Engr. Co. Excellent condition $1000.00
7—Type LR 10″ Series 900 Cameron Single Blowout preventer. Good condition $400.00
1—Set 2¼″ x 72″ B-J Weldless Elevator links $250.00
1—1942 GMC Water Truck with 2000 Gal. tank. Good rubber $1000.00
1—4′ Lee C. Moore derrick—Crown extension. Good condition $500.00
Call or write
ROY BULLS, Phone 3-8307
310-B West Eleventh, Amarillo, Texas

FOR SALE—ALL STEEL ROOF TANKS
2—80,000 bbl., 5—55,000 bbl., 1—25,000 bbl. and 10—10,000 bbl., 4—5,000 bbl., 22—1,250 bbl.
All cleaned out ready to cut down, located Wichita, Kansas, priced standing, cut down, or rebuilt your grade.
P.O. Box 1858 **W. C. BERRY** **Phone 3-6141, Tulsa, Okla.**

EQUIPMENT FOR SALE

WELL drilling equipment, new or used Spudders, rotaries, core & shot hole drills, tools, pipe, bits, blocks, pump jacks, valves. Everything for well drilling and service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

FOR SALE: Hydraulic pipe pulling equipment, 2 speed jacks, displacement pump, spiders, slips, etc. All mounted on 2 ton Dodge truck, all in first class condition and ready to work. Located at Artesia, New Mexico. A & B DRILLING COMPANY, Box 563, Artesia, New Mexico. Phone 1284.

FOR SALE
2—WAK Waukesha engines complete with clutches. These engines are completely rebuilt and guaranteed for 90 days. Each $1750.00
Call or write
ROY BULLS, Phone 3-8307
310-B West Eleventh, Amarillo, Texas

Gas Desulphurization Plant For Sale

Complete facilities. Can be used on location or dismantled and moved. Can be converted into gasoline plant. In Excellent Condition, used only a short time. Priced considerably below present replacement cost. Consists of following:

SOLUTION—MEA 30%—440 GPM
30 million cubic feet per day
Gas pressure—40 PSIG
Gas temperature—105°
Gas specific gravity—0.78
H_2S Content inlet—365 GR/100CF
H_2S Content outlet—0 GR/100CF
Solution—MEA 30%

Buildings and equipment in place:
1—Office and Warehouse, frame building, 24′-0″ x 36′-0″.
1—Pump and Instrument Building, steel frame, 40′-3″ x 24′-9″.
1—Boiler House, steel construction, 61′-0″ x 42′-6″, 31′-0″ ceiling.
1—Reactivator.
1—Reflux Accumulator.
2—Reflex Pumps.
1—Absorber.
1—4-unit Fin Fan Cooling Heat Exchanger.
1—Knock-out Drum.
1—Solution Heat Exchanger.
1—Reboiler.
1—Water Softener Unit and Pump.
2—24,000 lbs.-per-hour B & W gas fired Boilers, with steam turbines and speed reducers.
1—Sewage Disposal System.

This plant is complete and in good operating condition. For further data or appointment to inspect plant, contact:

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1400 West Tenth Amarillo, Texas
Tel. 3-2855

EQUIPMENT FOR SALE

GAS METERS FOR SALE. Westcott, Foxboro and Emco. Good condition. Geo. R Milner, Box 124, Okmulgee, Oklahoma.

FOR SALE: One Barrel Type Ethyl Lead Plant. Hutex Oil & Refining Company, P. O. Box 2146, Houston, Texas.

CASING

7" OD 26# Grade J55 Youngstown Range 3 with Hydril Speedite Threads. Streamline, 5300 feet, located Magnolia, Arkansas. Condition like new Price $2.25 per ft. F.O.B. Magnolia.

SAM SIEGEL

Ph. 4-6512, Shreveport, Louisiana.

FOR SALE AT HOUSTON

5451'	5½" x 17#
4600'	7" x 23#

J-55, Range 2, Short T & C, New, Seamless, Tested 3000 psi, **IMPORTED** CASING.

BARON TUBE CO.
722 Oliver St., NW
Atlanta, Ga.
Phone: Atwood 9721

EQUIPMENT FOR SALE

TWO FAILING 1500 heavy duty drills with 4½ x 6 pumps, automatic pulldown, and mounted on International trucks. Write P. O. Box 819, Longmont, Colorado. Phone 1333.

TWO Hydraulic Pipe Pulling machines, good condition. One mounted on Half-track, one on trailer. Ace Duncan, Telephone 2-1414, Tulsa, Oklahoma.

FOR SALE: 2—New B. J. Multiplex 6 x 8 x 10 pipe line pumps, 1000 Gal. @ 400 ft., maximum head 2000', List $3468.00 each, Our Price $1250.00 each. Bender Oil Operations, P.O. Box 52, Bakersfield, California.

FOR SALE

Approximately 50 power cylinder heads for Worthington LTC compressors and 50 power cylinder heads for R.A. Series Clark compressors, used but in good condition; subject to inspection. Price: Worthington heads $55.00 ea., Clark heads $40.00 ea., f.o.b. shipping point. United Iron & Machine Works, 249 N. Port Ave., Corpus Christi, Texas, phone 4-5453.

WORTHINGTON ENGINE

Model DDG, 450 HP, 360 RPM, 5 Cylinders, 4 cycle, 13¼" Bore x 17½" stroke. Under operation only 2 years. Rebuilt and guaranteed. Gas, Diesel or Dual. with or without

Worthington Duplex Double Acting Pump, 3½"x18", 2,500# pressure, 72 strokes per min.

Above units in excellent condition.

MANUFACTURERS EQUIPMENT CO.
1676 E. 18th St., Cleveland, O.

EQUIPMENT FOR SALE

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE: 40,000 ft. #1 3½" O.D. standard plain end line $0.55 per ft. 20,000 ft. 4" O.D. flues. Rogers Pipe and Supply Company, Phone 5-8850, Tulsa, Oklahoma.

FOR SALE: 2,500 ft. Rotary drilling rig with double section derrick, Cardwell draw works, 8¾ by 12 Gardner-Denver pump and other accessories. Phone Jackson 8-2897, or write Gene Graham Drilling Co., Box 5183, Okla. City.

FOR SALE: Two Denver-Gardner 5 to 7¼ x 10, Figure FO-FXO, power pumps. Like new condition. $3500.00 each. J. A. Finlayson, 108 E. 4th St., Tyler, Texas. Phone 3-3563.

FOR SALE: Sullivan "300-A" drilling rig, complete with 2—Buda engines, one practically new, draw works, rotary table, 65' derrick with 20' section to pull doubles; Wheatley 7 x 10 mud pump, swivel, traveling block, kelly, etc. All mounted on tandem trailer. Excellent rig for drilling to 3000' or deep core drilling. Rig in excellent condition. Price less drill pipe $24,000.00. Contact Box 1022 or Phone 813, Del Rio, Texas, for inventory.

JOY 300 Drilling Rig butane powered, mounted on Brockway 6x6 truck. 3500 feet 3½ inch drill pipe. Auxiliary mud pump and butane engine as separate unit. All tools and equipment included. This rig in first-class working condition and can be seen working now. Call or write Steele Brothers, Crete, Nebraska. Phone 127.

COUPLINGS For Sale: 5,000 8⅝" O.D. Recessed Couplings, off of 28.55# pipe; priced $1.50 each; 3000 10¾" O.D. off of 41# pipe, recessed; 2500 12¾" O.D. recessed; all of the above 8V thread. All couplings cleaned and in first-class condition. A. A. Gilbert Pipe & Supply Co., P. O. Box 986, Shreveport, La.

TWO-195' x 40' x 10'6" BARGES

Ideally suited for conversion to drilling barges.

All welded steel construction, good condition, Coast Guard certified, built 1943. May be inspected Houston area.

Owner has ship ways available for bottom inspection and conversion plus engineered supervision on cost plus basis.

Price, as is, $42,500 each.

Subject to prior sale and prior commitment of yard facilities.

Manager, 320 Melrose Bldg.,
Houston, Texas, Charter-5585

7" CASING

7500 ft.—26 lb. Lapweld
2350 ft.—26 lb. Seamless
4500 ft.—24 lb. Seamless

All above A-1 used casing, 10 V thd., Range 1, priced attractively for quick removal present location Burbank, Okla.

MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128 Tulsa, Okla.

Unretouched Photograph

FOR SALE

Seismograph Service Corp. 24 channel instrument truck, completely overhauled, all instruments put in like-new condition. 26 amplifiers, 28 galvanometers, 30 geophones (Midwestern Type 200), 2 new 1400' cables. Instrument cab completely new, all steel construction, stainless steel lined with 1/16" stainless steel floor welded over 3/16" steel sub-floor. F6 Ford truck, aprox. 5,000 miles, completely repainted, equipped with heavy-duty front bumper and brush guard, fender clearance increased and heavy-duty raised running boards installed, has turning lights and Leech-Neville generator for battery charging.

Priced Exceptionally Low . . . For Immediate Sale

3401 SOUTH HARVARD
TULSA • PHONE 7-7521

MIDWESTERN
GEOPHYSICAL LABORATORY

FOR SALE

Complete National 100 Rig including 3 PTD-6 Superior Diesel Engines with dual fuel equipment, 136' Lee C. Moore Mast with 8' substructure, 2 C-350 Ideal Power Pumps, Ideal Type 548 TC Traveling Block, Type R3 Swivel, and Type MS-20½ Rotary Table. Excellent condition, priced reasonable, located in Montana. Complete inventory upon request.

Box G-341

The Oil and Gas Journal,
Tulsa, Oklahoma

24" LINE PIPE Available For Immediate Shipment

Gas Pipeline company has available for sale approximately 15 miles of 24" O.D. new .310" wall line pipe, API 5LX42, hydrostatically tested to 930# and inspected at mill by established Engineering Company.

Write Box G-334

The Oil and Gas Journal,
Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: Fort Worth Super J. Spudder, skid mounted, V-Belt drive, 60′ pipe mast, Cummins diesel engine Model-H. Some other equipment if desired. Wilson Drilling Company, Box 5656, Eldorado, Texas.

FOR SALE in the Russell-Great Bend, Kansas Area approximately 150,000′ of 2″ water line buried 30-36″ deep which will be available for reclaim during wheat harvest and wheat planting period. Cities Service Oil, Patridge, Bartlesville, Okla.

FOR SALE: 8—Shriver 42″x42″ cast iron Filter Presses, Plate & Frame type, 18, 27, and 54 chambers, 1″ cake; 15—Sperry 18″x18″ cast iron Filter Presses, 11 chambers; 2—#12 Sweetland Filters for 36 leaves on 4″ centers. Immediate shipment. Attractively priced. Consolidated Products Co., Inc., 17-20 Park Row, New York 38, N. Y. BArclay 7-0600.

FOR SALE—At Oklahoma City, N-7 Brewster Rig with 3 NKU Waukesha Engines, D-500 Emsco Pump, 127 ft. Lee C. Moore Mast with 7 ft. Substructure, and with or without drill pipe. All in excellent condition and complete in every respect. Box G-347, The Oil and Gas Journal, Tulsa, Oklahoma.

2—OILWELL 3″ x 6″ Triplex Power Pumps w/ porcelain plungers. 7—75 HP, 440-V, 900 RPM, Open type electric motors. 13—6 groove D-section sheaves 15″ to 34″ diameter. 4000′—1⅛″ Cement Lined Pipe. Morrison Producing Company, P. O. Box 712, El Dorado, Kansas.

USED ROTARY, cable tools, and production equipment. E. A. Kelly, 3131 S.E. 29th Street, P. O. Box 861, Oklahoma City. Phone Jackson 56407.

R-3 WICH-TEX Rig. 68′ 8″ poles, LO525 Buda Traveling Block hook, bails & lines. Ready to work. W. R. Holden, Phone 1222, Pawhuska, Oklahoma.

FOR SALE: Madison, Kansas, two used 16″ x 20″ Horizontal Gaso Vacuum Pumps, each $200.00. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE: At Madison, Kansas, a large quantity of ⅝″ and ¾″ sucker rods suitable for reuse, recently reclaimed because of water flood operations, 10c & 15c per foot. Cities Service Oil, Patridge, Bartlesville, Okla.

FOR SALE: 400 ft. new alloy seamless steel tubing AISI 4142 4½″ x 2¾″ ID 16 ft. lengths. Gulf Tool Company, P. O. Box 707, Phone FA 8088, Houston, Texas.

FOR SALE at Lima, Ohio, Refinery—Regular accumulations of American Cyanamide M S synthetic equilibrium catalyst UPO Activity 26. The Standard Oil Company (Ohio), Midland Bldg., Cleveland 15, Ohio. R. L. Charles.

1951 1½ TON Chevrolet truck, Leland oilfield bed with Tulsa #23 winch, rolling tailboard and ginpoles. 8,500 actual miles. First class condition. Call 5006, Bartlesville, Okla.

600 FEET 2⅞—10.4#, range 1 drill pipe with 2⅞ API Internal Flush tool joints. 325 feet 2⅞—6.65#, range 1 drill pipe with 2⅞ API Reg. tool joints. 750 feet 2⅜—6.65#, range 1 drill pipe with 2⅜ API Internal Flush tool joints. All $2.00 per foot. P & S Engineering Company, 5006, Bartlesville, Oklahoma.

2500′ 8⅝″ OD 28# Used Lw Pe Line Pipe
Drl. $1.85 per foot f.o.b. May, Texas.

FRANK MORRIS AND COMPANY
424 South Cheyenne St., Tulsa, Oklahoma
Telephone 2-6247

GAS BOOSTER PLANT FOR SALE

6 Type 80 Compressors, Electric Generators, Electric Motors, Water Pumps, Water Tanks, Boiler, Heat Exchanger, Pipe and Valves.
Plant Located in Webb County, Texas

ALFRED B. KERN COMPANY
223 Wright Bldg. Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: R. L. Dubbledrum Cardwell fully equipped. Oklahoma City, Oklahoma, Melrose 8-5108.

FOR SALE: Walker-Neer 32 Special drilling and servicing unit complete. Also DB114 Emsco pumping unit. G & H Supply Co., Okla. City.

FOR SALE: Two hydraulic casing pulling units, in good condition with two tool houses and two late model pick-up trucks. Pipe Pulling, Inc., 629 West Broadway, Phone 475, Stafford, Kansas.

CASING FOR SALE: 6000′—6¼″ ID—6⅝″ OD, 13#, Byers Gen. Wrought Iron—T&C—14 Thds. New, prime, 20′ Lgths. JULIUS M. FOGELMAN, 1649 Perkiomen Ave., Reading, Penna.

FOR SALE: National Drilling Rig. Capacity 4,000 Feet. Good Condition. Buffalo Motor. Tools and Line not Included. Wolf's Head Oil Refining Co., Inc., P.O. Box 137, Oil City, Pennsylvania.

EQUIPMENT WANTED

WANTED: Hydraulic Casing pulling outfit to pull 6″-12″ casing of waterwells, give price and full description. H. Man, Carrera 18 No. 268, Barquisimeto, Venezuela.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

WANTED: Three engine compound for Wilson Titan drawworks. Makin Drilling Company, Box 1628, Phone 3-3141, Hobbs New Mexico.

WANTED: One Thrible Jack-knife and substructure. No Junk Wanted. Makin Drilling Company, Phone 3-3141, Hobbs, New Mexico.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale? Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

HELP WANTED

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

GEOLOGIST with Canadian or Rocky Mountain experience wanted by independent oil company to headquarter in Calgary Replies will be kept confidential. Box G-265, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Process engineer familiar with all types of refinery operations including asphalt, coking and cat cracking. Location—Rocky Mountain Area. Box G-323, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED professional engineers experienced in evaluation oil and gas properties by major oil company headquarters Tulsa. State experience and qualifications. Box 521, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-863, The Oil and Gas Journal, Tulsa, Oklahoma.

DIVISION Geologist with Louisiana Gulf Coast regional subsurface experience required by sound, substantial company in New Orleans. In reply, please state salary expected and give details of education and experience. Replies confidential. Box G-313, The Oil and Gas Journal, Tulsa Oklahoma.

GEOLOGIST wanted to headquarter in Denver with independent oil company. Must have well sitting, sample examination and mapping experience, and at least two years experience in Rocky Mountain Area. Reply will be kept confidential. Box G-264, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

PROFESSOR or Instructor in Petroleum Engineering: To teach upperclass and graduate courses in mechanical and operational methods in petroleum production, drilling, transportation, etc. Should have MS degree as petroleum, mechanical, or other qualified engineer, plus field experience. Appointments permanent. Contract for 12 months rather than academic year. Salary open. Applicants write to Division of Petroleum and Natural Gas Engineering, The Pennsylvania State College, Pa.

WANTED—Seismograph Party Chief. Must be fully qualified. Age 27-38. A good opportunity for the right man. Box G-348, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMIST Gauger for oil terminal near Kansas City, Missouri. Good permanent position. Write experience fully. Box G-350, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC Party Chief for work in United States with degree in Geophysics, Geology, or Engineering, age 26 to 35, capable of advancing, in small progressive Contract Seismograph Company. Must be good interpreter. Salary commensurate with ability. Please include education and complete brief of experience in first reply. Replies confidential. Box G-351, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES Engineer wanted to cover Petro-Chem, Industrial and Commercial Trade in Oklahoma. On Drawing Account and Commission. If interested mail personal resume, references, etc. Box 1743, Houston, Texas.

SALESMAN for petroleum products, pipe line and tank cars. Should have acquaintance Minnesota, Dakotas, or Wisconsin. Write fully stating salary. Box G-343, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Chemical Engineers and Chemists with or without experience for positions in Research and Development department, located in Tulsa. State qualifications and salary expected. Write Personnel Department, P. O. Box 381, Tulsa, Oklahoma.

MEN WANTED IN ALL PARTS UNITED STATES who contact pipe and refinery superintendents sell line sold for past 18 years to the oil and gas industry. Will pay large income (commission) right men. Write details, experience. Dallas Mfg. & Sales Co., Dallas, Texas.

INDUSTRIAL CONTROLS DIVISION MANAGER. Progressive Manufacturer Automatic Controls has opening for Manager Industrial Division with broad instrument and process control sales background. Midwest location. Salary and Bonus. Permanent Career—Opportunity unlimited. Box G-339, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

QUALIFIED SECRETARY—With extensive oil experience desires position with independent oil company or oil operator. Box G-345, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER, Math. Masters. 4 years P.E. experience, all phases, desires chance to get into teaching. Resume on request. Box G-340, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPING AND ENGINEERING DESIGN SUPERVISOR: 18 years experience in refinery and chemical plant design and construction. Box G-338, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIGN or Construction—desires responsible position such as chief engineer or equivalent in the construction of oil refineries or petrochemical plants. Background covers 25 years experience in the processing field dealing mostly with the mechanical and structural phases. Satisfactory references can be furnished to interested parties. Tulsa location preferred. Box G-349, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM Engineer, 7 years major company experience, Gulf Coast and West Texas, production, drilling, and reservoir analysis. Employed, married, age 31. Desires position with independent. Box G-309, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628, Ph. No. 3-3141, Hobbs, New Mexico.

PETROLEUM GEOLOGIST, four years subsurface, surface, 34, married, desires employment with independent oil company. Box G-322, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer, ten years' experience with major oil company, desires responsible position with independent operator. Box G-325, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER, employed, 11 years experience Major company and Service company, drilling and production, field and staff work. Box G-345, The Oil and Gas Journal, Tulsa, Oklahoma.

CONTRACT: Pumping, switching, well testing, orifice meter work, well completion work, in the Chandler, Stroud, Cushing, Oklahoma, area. Box G-342, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Executive, 39, lawyer, exp. land and concession work, public and industrial relations with U. S. majors, fluent Spanish, intimately familiar Peru, at present with independent development organization, seeks connection oil company now entering Peru. Box G-352, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER: Married, age 32, 7 years experience production and drilling, Gulf Coast area. Desires permanent position w growing organization. Box G-337, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

BUSINESS OPPORTUNITIES

WANT half interest small still for straight gas and tractor fuel. Excellent location new field. Jonnum Mfg. Co., Pittsburg, Kansas.

EXPERIENCED oil field worker needs $30,000 to drill shallow leases. Will give 3% Interest on Principal plus 1/16 working interest in leases. For additional information write to Box G-344, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION FOR SALE

BY OWNER: Interest in 25 sand wells in Indiana—one pool. Average monthly income $1350.00; expense $50.00. Address Box 245 or Phone 801, Mt. Carmel, Ill.

PRODUCTION WANTED

WANT producing wells in paraffin or heavy oil areas where heating bottom hole fluids with Parelex Electric Heater could increase production. Parelex Corporation, Box 552, Houston 1, Texas.

Transact Your

OIL BUSINESS

With An Experienced Contact

On GROUND FLOOR Basis of

Oil Investments

Drilling Proposals

A. S. BERRY

P.O. Box 1383 522 Wright Bldg.
Phone 5-5402, Tulsa, Okla.

LEASE AND DRILLING BLOCKS

DALLAM COUNTY, TEXAS: 8000 acres solid block one owner. ½ County leased to Major Companies. $1.25 bonus, $1.00 rentals, 10 year commercial lease. Combest Royalty Company, Amarillo, Texas.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

DRILLING Deals. See A. L. Bowles, Rollow Bldg., Ada, Okla.

FOR SALE: 320 acre state oil and gas lease in Lea County, New Mexico. Box G-320, The Oil and Gas Journal, Tulsa, Oklahoma.

HAVE you drilled on the best looking structures and missed? If so, then let me stake you a location on your leases or farm out some of mine to you. Box G-317, The Oil and Gas Journal, Tulsa, Oklahoma.

AM offering 2000 acres of mineral rights perpetual full participating under 50 quarter sections scattered in Northwestern Kansas Counties. Will sell all or one-half at $10.00 an acre. Address 409 Commercial Bank Bldg., Muskogee, Oklahoma.

5000 ACRES-2800 acres GRAY COUNTY, TEXAS. Semi-proven oil and gas 3000' Small cash bonus and little override. 5 year commercial lease $1.00 rentals. Combest Royalty Co., Amarillo, Texas.

1,000 ACRES in one lease—Illinois Basin. Depth approx. 2,100 ft. Devonian Prospect. Small production found in year 1911—today with application of acid, substantial production should be developed. Need capital to put in production. Address Box 245 or Phone 801, Mt. Carmel, Ill.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

DRILLING DEALS WANTED

We will buy production, overrides, and producing royalties

Write Phone 875 Wire

GEO. L. AYCOCK, JR.
Guymon, Oklahoma

LEASES ROYALTIES

Producing and Nonproducing

Bought and Sold—Any Area

Inquiries Invited

B. D. BUCKLEY

6635 Delmar Ave., St. Louis 5, Mo.

NOTHING RISKED NOTHING GAINED

This Year the West Looks for Its Biggest Oil Boom

I am offering for sale subject to final confirmation—

2,000 acres in Moffat County, Colo.
3,000 acres in Kit Carson County, Colo.
480 acres in Washington County, Colo.
3,800 acres in Mora County, New Mex.
6,000 acres in Jackson County, S. Dak.
3,000 acres in Barnes County, N. Dak.
3,500 acres in Weston County, Wyo.
2,900 acres in Custer County, Mont.
5,000 acres in Dallam County, Texas
3,000 acres in Bent County, Colo.
35,000 acres in Hayes County, Nebraska.
50 bbls. per day net production in Marion County, Kansas. Send for DYER'S OIL LEASE TRADER listing these and many others—it's free.

F. W. DYER

1835 Champa St. Denver, Colo.

ROYALTIES

OFFERING Royalties, Original Elk City Pool and Trends of Western Oklahoma where test wells are likely to be drilled by major companies. A. S. Berry, P.O. Box 1383, Tulsa, Okla.

PRODUCING ROYALTY and overrides for sale. Wire-write-call for particulars. JACK EAGLE, 706 City Natl. Bldg., Okla. City, Okla. REgent 6-7027.

QUICK CASH: Producing royalties, Overrides or Production . . . no delay. Phone 72-4533, Robert L. Kinkaid . . . P.O. Box 28, Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

OVERRIDE ROYALTY
SOUTHEAST NEW MEXICO

Located up against well to drill offset to shut in well, which showed for production in 2 oil sands above 3200 ft. Complete data on request to Oil Men & Investors who can evaluate great potential worth.

W. J. PETERMAN, GEOLOGIST
Portales New Mexico

ROYALTIES WANTED

Producing Royalties
High Grade Only
Send Full Particulars
Address

C. C. HARMON

719 World Bldg., Tulsa, Okla.
P.O. Box 2151

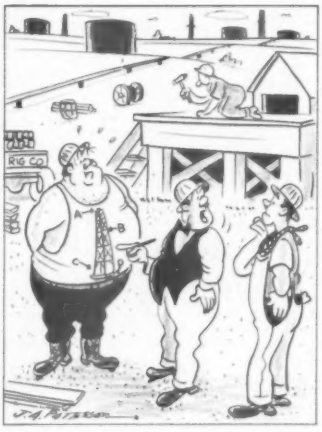
GEOLOGISTS

GET MORE for our Oklahoma oil properties with a geological sales report. Box G-335, The Oil and Gas Journal, Tulsa, Okla.

REAL ESTATE

COMMERCIAL Sites (100 x 235 ft.), Residential lots (75 x 140 ft.) on Highway 83 just north of Minot (restricted to new construction). L. A. Joyce, Box 575, Dial 37-127, Minot, North Dakota.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.



"... then when you get C and D set up, you add A and B and you're all set to go."

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Allis-Chalmers Announces Dallas Sales Promotions

W. S. Barackman, Jr., is branch manager at Dallas for the tractor division, Allis-Chalmers Manufacturing

BARACKMAN

WINDBIGLER

Co., succeeding A. J. Simpson, retired, according to an announcement by Frank Mussell, vice president and general sales manager. R. H. Windbigler succeeds Barackman as industrial sales manager at Dallas.

Barackman started in the sales department of A-C's tractor division in Milwaukee in 1945. He was industrial district manager in Oklahoma and southern Kansas, and assistant industrial sales manager in the Kansas City branch before going to Dallas in 1949.

Windbigler has been special industrial representative for the company at Atlanta branch.

National Carbon Produces Karbate Equipment Films

At a press preview in early February, National Carbon Co. screened two new, fast-moving color motion pictures titled "Meeting the Challenge," and "By Way of Experience," produced to describe and demonstrate the nature, uses, and practical installation of the company's Karbate impervious graphite corrosion resistant equipment.

"Meeting the Challenge," running time of which is 14 minutes, deals with equipment design and process application. Secondly, "By Way of Experience," running time of which is 12 minutes, depicts proper installation and maintenance techniques. The first film traces the history of Karbate impervious graphite; experiments and developments; physical and chemical properties, and specific applications in modern process industries. Especially featured is a diagrammatic sequence showing a processing plant completely constructed of Karbate equipment components. The second film demonstrates in detail the ease and practicability of assembling, installing, and maintaining such equipment as pipe and fittings, joints and couplings, heat exchangers, valves, and towers. An important sequence shows the step-by-step procedure in alteration of a large Karbate unit in the field.

Lane-Wells Creates Geophysical Section

J. STICK

Reflecting the growing development and activity in geophysics, Lane-Wells Co. has created a geophysical section to provide better service for its 8,000 oil-company customers, according to Rodney S. Durkee, president. John Stick, Jr. formerly chief electrical engineer and associated with Lane-Wells since 1937, has been appointed chief geophysical engineer in charge of the new section. Stick is a graduate of California Institute of Technology.

A. B. (Burm) Winter, formerly assistant chief electrical engineer, has been appointed chief electrical engineer. He has had a varied experience with Lane-Wells since going to work as a gun perforating operator in California in 1934. He served as division electrolog and radioactivity engineer in Oklahoma City, and followed with 18 months in Trinidad as Lane-Wells representative. Then he was assigned to the Gulf Coast as division radioactivity engineer before being transferred back to Los Angeles.

LEGAL

Sealed bids will be received at the office of the Area Director, Bureau of Indian Affairs, Room 305, Federal Building, Albuquerque, New Mexico, until 2:00 o'clock, P.M., M.S.T., March 17, 1953, and then publicly opened for sale of oil and gas leases on 15 tracts of Jicarilla Tribal Indian lands, totaling 38,672.46 acres, more or less, located in the Rio Arriba County of New Mexico on the Jicarilla Indian Reservation. Each tract containing four sections each, is offered for lease separately. For complete description of the land, location, provisions and stipulations of the leases to be sold, address the Superintendent Jicarilla Indian Agency, Dulce, New Mexico.

NATIONAL RAPID MECHANICAL WATER FILTERS

Four 8′ x 5′ National Rapid Mechanical Water Filters in West Texas.

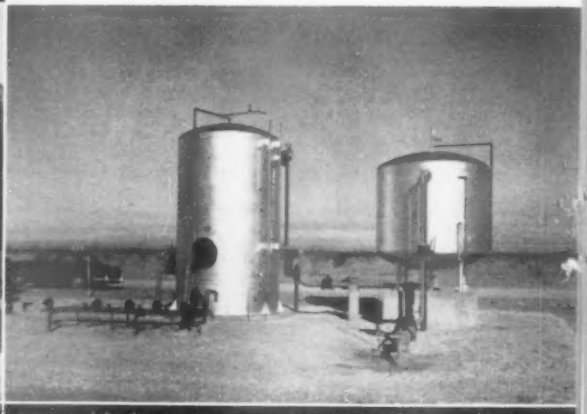
Four 10′ x 5′ National Rapid Mechanical Water Filters on an Oklahoma water flood project.

National Rapid Mechanical Water Filters are used for filtering water in salt water disposal and water flood projects and municipality installations. Filters are rated according to best empirical values. Common backwash rates are 12 to 20 gallons per minute, per sq. ft. of filter area.

Size	Nominal Water Cap. Bbls./Day	Approximate Weight of 40# W.P.
4′ x 5′	1060	1400#
6′ x 5′	2300	2100#
7′ x 5′	3200	2400#
8′ x 5′	4200	3200#
10′ x 5′	6600	5540#

NOTE: Filters are furnished in 40, 75 and 100 PSI W.P.

A National 4′ x 5′ Rapid Mechanical Water Filter in a water disposal plant in Texas.



Injection water passes into National Accumulator from National Rapid Mechanical Water Filter.

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NATIONAL TANK COMPANY

TULSA, OKLAHOMA

3-3-53

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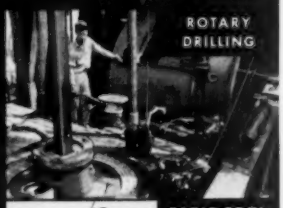
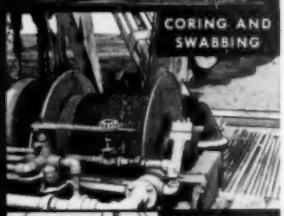
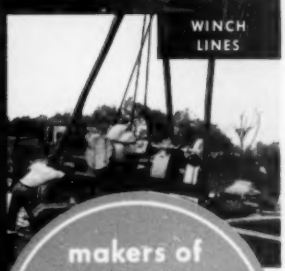
for Every Oil Field Use







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*Drill stems are deliberately failed in the Hughes Laboratory in evaluating field performance of pipe-to-tool-joint connections. Pioneered by Hughes, these tests simulate conditions that cause drill stems to fail in the field.

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3 HUGHES Flash-Weld Joints have been proved on more than 25,000,000 feet of drill pipe and by 15 years of superior field service.*

4 HUGHES Flash-Weld drill stem is the most dependable drill stem you can run in your well.

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